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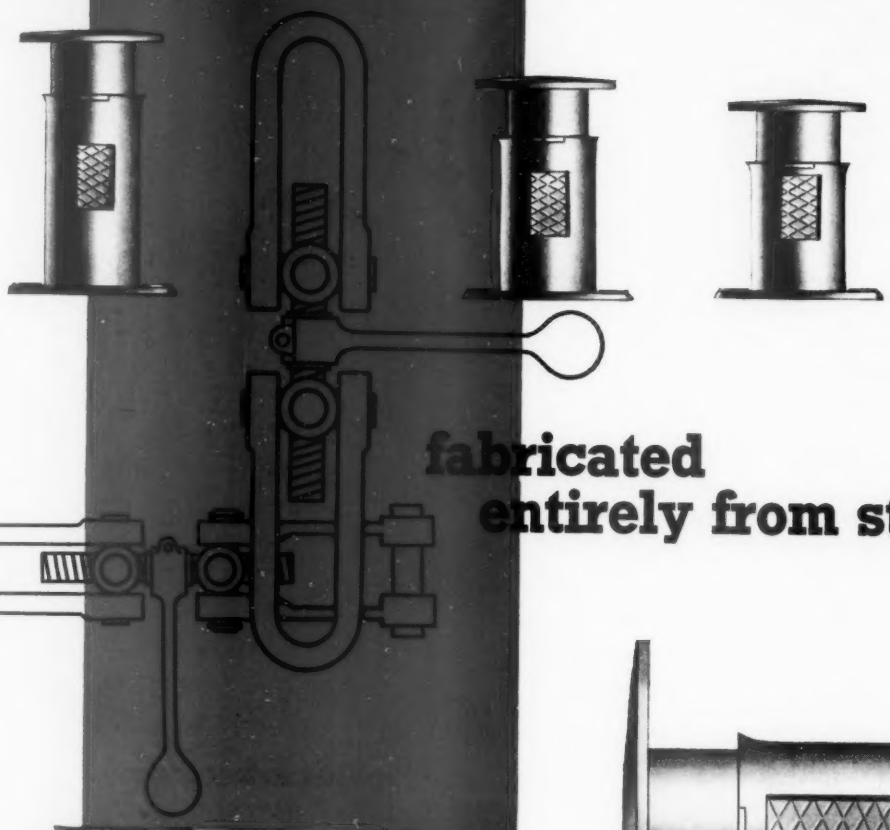

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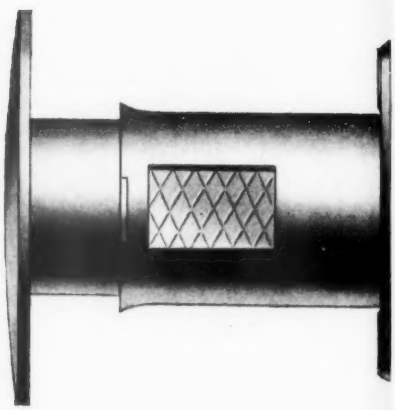

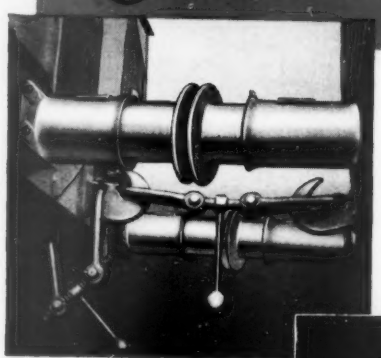

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No Bone in the Cupboard

INEVITABLY, because of the inquiry now being made into railway pay, the wage increase of the National Union of Railwaymen has been rejected by the British Transport Commission. The determination of the railwaymen, even backed up by sympathetic findings from the Guillebaud Committee, will be of little avail in the face of the desperate financial position of the Commission. Of the £400 million Government loan, supposed to last until the end of 1961, more than half was spent by the end of last year and, after this year's losses have been met, there probably will not be much more than a million pounds in hand for the next two years. Even at present rates of wages and salaries this amount would seem to be inadequate for the Commission's purposes. The union's belief that the railways should receive a State subsidy must be strongly resisted: a subsidy inevitably destroys individuality and inhibits freedom of action. It encourages indifference to profit because of the knowledge that "there's plenty more where that came from." While the position is developing, some workers have begun to drift from the railways to private industry, against which charges of enticement are currently being made by the Commission, The drift has its good and its bad side. Where, as is most likely to be the case, it occurs among skilled workers, it causes the greatest damage. On the other hand, the Guillebaud job reappraisals may result in down- as well as up-gradings. Where redundancies are found, the Commission will be in at least as difficult a position with the unions as where it will be expected to raise pay as the results of up-grading. With insufficient funds to carry on with its existing pay structure, the Commission will have to accept a numerically lower payroll if it is to attempt to meet union demands. It will have to carry out its business with a smaller, more compact, but probably basically more highly-paid staff. This procedure has already been experienced by other business organisations and the forced changes sometimes have proved surprisingly successful. With union co-operation in the introduction of labour-saving methods and machines and the necessary good will, it may well be that British Railways will pull out of its difficulties yet.

Railway Labour Shortages

SHORTAGE of manpower in certain grades of the railway service in the London and some other areas is acute. It is one result of full employment, and of the attraction not only of higher wages but also of the more regular hours and greater cleanliness of some other employments. Mr. John Ryan, Vice-Chairman of the London & South Eastern Regional Board for Industry, and incidentally a Member of the Western Area Board of the British Transport Commission, told the former body last week that transport in the London area had never been in a worse position. Some sections of transport in London, he added, had recently been almost at breaking point. That is putting the matter strongly, but the situation is serious. Something can be achieved as regards train crews by rostering men from places where there is less, or no, shortage of men. The position is particularly bad in the case of signalmen. They take long to train, and their responsibilities demand the highest personal qualities, not easy to find in some labour markets. The railway labour situation is expected to improve when a more prosperous railway system, with a greater proportion of skilled work to perform, offers better pay and conditions. Meanwhile there is a difficult interim period for British Railways and London Transport Executive. Much will depend on the findings of the Guillebaud report.

Higher Industrial Production

THE industrial revival in October was reflected to some extent in British Railways goods traffics. Output was 9 per cent higher than in October of last year. The increase in railway merchandise receipts was only some 2 per cent, but mineral traffics, which are a useful index of industrial activity, were up over 10 per cent compared with 1958. The latter rise is not surprising for recovery is reported in more sections of heavy industry. A good many steel companies have been receiving increased flows of orders from engineering firms, and there are reports of rising orders for machine tools. The proportion of lighter engineering products, components, and so on consigned by rail as merchandise is not known, but in view of a reported fall in demand for some durable consumer goods a greater increase in railway merchandise traffic might perhaps have been expected. Apart from the expected decline in coal traffic, last year was a very poor one for the railways, more especially in the amount of merchandise carried. A considerably greater proportion of the increased industrial output must be moved by rail to put British Railways in an economically healthy state.

Study of Transport History

SUPPORT for the view that those engaged in transport should study its history is given by Mr. R. M. Robbins, Secretary & Chief Public Relations Officer, London Transport Executive, in a paper last Monday to the Metropolitan Section of the Institute of Transport. Because transport is a technique, the history of each branch is given a framework by the technical limitations imposed on it, and a primary part of its story is the technical evolution by which these limitations have been lessened or removed. The motive behind the origin

and progress of the different modes of transport must be found in the thoughts and decisions of men. The study of policies and decision-making affords the student much material to which stimulates fresh inquiry and produces fresh interpretations relevant to contemporary problems. To survey transport with an historical outlook, Mr. Robbins stresses, does not mean wanting to retain its curiosities. The historical approach shows clearly that adaptability to change is the essence of good transport management. Not that history repeats itself. The history of the Railway & Canal Traffic Act of 1888, and its sequel, mentioned in the paper, shows this, but is the more worth study because of the differences between past and present events in the field of railway charges. Those who agree with these views will be glad that the Institute of Transport is to include at a future date the history and development of transport in its syllabus of examination for corporate membership.

Frictionally Controlled Buffer Stops

TWELVE sets of frictionally-controlled braking buffer-stops are being installed by British Railways at Manchester London Road Station. Brief reference to the preliminary test on the first two sets was made in our last week's issue. The new buffers have been supplied by Godwin Warren (Engineering) Limited, of Bristol, to meet a British Railways specification. The principles of the design have been proved in many terminals and sidings throughout Central Europe and at Euston, London Midland Region, where there is a somewhat similar installation of the early 1930's. One of the important characteristics of the Godwin Warren sliding-sleeper stop is its equal effectiveness in arresting safely a railcar of only 50 tons or a heavy long-distance train. To make this possible the weight of the locomotive or leading vehicle is a factor of the initial frictional effect of dragging specially interlinked sleepers along the concrete raft beneath the track. The spacing of braking shoes in advance of the stop ensures that their effect is also progressive.

The "Directory" Further Enlarged

THE value for ready reference of the 1959-60 edition, the 65th, of the "Directory of Railway Officials & Year Book," the subject of brief notice on page 537, is greatly increased by inclusion of a section giving details of the suppliers of signalling and interlocking equipment listed by countries and also under principal classes of product. The latter include mechanical and power signalling apparatus, electrical indicating and train-describing equipment, level-crossing gates, barriers and warning signals, A.T.C. and train-stops, C.T.C. and remote-control systems, and marshalling yard equipment. With the sections introduced last year, featuring the suppliers of locomotives and rolling stock, the new edition shows the sources throughout the world of a large proportion of railway material. Publication has been delayed by last summer's dispute in the printing industry. Nevertheless with the detailed information on railways in nearly every country in the world, including for instance, the newly-formed Republic of Guinea, the directory is, we believe, unrivalled in its comprehensiveness and accuracy. The opportunity has been taken to revise the contents to September. As in previous years, the authorities in China have not seen their way to providing official particulars, but it has been possible to give a good deal of information on developments in that country.

Master Schedule of Steel Standards

OVER the years a great many British standards for steel have been published to meet the demands of industry. There are now more than 100 standards covering steel as a material. Many of these standards themselves contain several separate specifications for different grades of steel. One of the most widely used standards, B.S.970, contains detailed specifications of over 100 wrought carbon and alloy steels for automobile and general engineering purposes. A great many of the steels to these specifications differ from one another only slightly, but because each is to a recognised British standard grade, steel producers are expected to supply any and every type. There exists today in the steel industry a needless and uneconomic diversity of output which standards have not been able to control. It is, therefore, gratifying that the British Standards Institute, with the collaboration of the steel industry and of important user-interests, has taken the first step towards ending this unsatisfactory state of affairs by publishing the first part of a master schedule of wrought steels. This first part is concerned with carbon steels and will be followed shortly by further parts dealing with alloy steels, and steels with specified mechanical properties but without detailed chemical composition.

Swiss Federal Railways' Budget for 1960

THE net receipts of Fr. 10,500,000 envisaged in the Swiss Federal Railways budget for 1960 as against a net loss of Fr. 31,000,000 budgeted for 1959 is indicative of the country's excellent economic condition, the expanding goods traffic to be expected in consequence, and the intense passenger traffic which continues unabated. The main source of the improvement is the increase in passenger fares, goods, express goods, luggage, and ancillary rates, in force from October 1, 1959. This increase is estimated to result in additional receipts totalling Fr. 45,000,000 and eliminate a loss which might have amounted to Fr. 30,000,000. A substantial part of the receipts will be absorbed by the continually rising cost of wages and salaries and social items for the staff. All these will total Fr. 575,700,000 or Fr. 33.8 million more than the total of Fr. 541,900,000 spent in 1958. Nevertheless, the budget does not provide any coverage for the expenditure to be incurred in connection with the health insurance scheme which becomes compulsory in Switzerland from January 1, 1960.

Plans for the Former G.C.R. Main Line

LONG-TERM developments are under consideration by British Railways, London Midland Region, for the integration of the main lines of the former Midland and Great Central Railways. Mr. E. W. Arkle, Director of Traffic Services of the Region, has pointed out that large capital works may be necessary to afford connections between the two systems, but that at the moment Regional resources of materials and manpower are engaged on electrification of the Western Division main lines. Advocates of complete closure, he states, are apt to overlook the virtues of the G.C.R. as a through route for such trains as car-sleeper and the London-Scotland "Starlight" services, apart from large coal movements out of the East Midlands and the important suburban business south of Aylesbury. There is, he believes, a good chance of the Great Central route becoming an important artery for the carriage of parcels and similar traffics between Marylebone, the Midlands, and the Manchester area. Reference already has been made in this journal to the plans for replacing the expresses between Marylebone and the North by diesel trains with Nottingham as their northern terminus, and for closing most of the smaller stations north of Aylesbury.

Jubilee of the S.R. Electrification

IN December, 1909, after more than six years of investigation and experiment, the London, Brighton & South Coast Railway inaugurated public electric traction on the 8½ miles of the South London Line between Victoria and London Bridge —the "Elevated Electric." As main-line electrification had been envisaged from the outset, a high-tension a.c. single-phase system, at 6,700 V., was adopted, and subsequently extended to 22¼ route-miles. The first world war retarded development, and, shortly after grouping, the new Southern Railway decided in the interests of standardisation to adopt the 600-V. d.c. system used on the L.S.W.R., because of ease of installation and low cost of construction and maintenance. Further L.B.S.C.R. lines, to Coulsdon and to Sutton, on which electrification was well advanced, nevertheless were completed on the overhead system and opened in 1925. Sixteen months later, the conversion of all overhead a.c. lines to third-rail d.c. was announced. The last S.R. "overhead electric" train left Victoria at 12.30 a.m. on September 22, 1929. It is paradoxical that a system adopted for its main-line potentialities should have become the nucleus of the world's greatest suburban electrification, and that, by the time that main-line electrification was achieved, it should have been replaced by the third-rail low-tension d.c. system. High tension a.c.

is now to come into its own, as a result of the British Transport Commission decision of March 6, 1956, except in the Southern Region in which it originated.

Another Transport Association

THE number of bodies which concern themselves with transport, but are not composed of people professionally connected with it, has been increased by the formation of the Road & Rail Association. Some details are given in our news section. The aims of the Association are unexceptionable. Briefly, they are to survey the present distribution in the United Kingdom of goods traffic between rail and road and "to investigate the reasons that have brought about the present situation;" to effect a better understanding of the economic and social consequences of the way in which internal goods transport facilities are being used; and to achieve more economic use. The Association is to acquire information and views in support of these aims, to publish schemes ameliorating the situation, and to enlist the help of any sympathetic person or public body. But Parliament, the Ministry of Transport, the British Transport Commission, the Institute of Transport, and many large-scale users of transport already devote much time to these questions. The Institute of Transport is a forum for many useful discussions on them. It would be a pity if more of the time of railway officers were to be absorbed, more especially in providing information.

Record Summer for Cross-Channel Ships

THE popularity of the Anglo-French steamer services of British Railways and the French National Railways is shown by the traffic figures for last summer. The total number of passengers was a little under 2,500,000, an increase of more than 300,000 on 1958. The number of road vehicles carried rose by 40,000 to a record figure of nearly 190,000. By far the most popular services were the short sea routes from Dover and Folkestone to Boulogne, Calais, and Dunkirk. These conveyed nearly 1,900,000 passengers and over 175,000 motorcars. With the introduction of larger motorcar ferries on the Dover/Boulogne service the number of vehicles carried last summer rose by nearly one-third. Passenger and vehicle traffic by the Southampton/St. Malo service also increased by almost one-third. Another record was the number, some 93,000, of day trips by special excursion steamers. No doubt the proportion of motorists, as distinct from boat train passengers, who travel by cross-Channel steamer is rising, but many people prefer the rail and steamer routes to and from the Continent at any time of year.

Golden Arrow Service

ONE of the most pleasant ways of travel between London and Paris is the "Golden Arrow," by Pullman train in England, a well-appointed steamer, fitted with stabilisers, for the short crossing, and Pullman car in the French boat train. The reversion next summer to the morning departure from Victoria, at 11 a.m., *via* Dover/Calais, with arrival at Paris Gare du Nord at 6.10 p.m., will afford a timing convenient for those who prefer this route; most people like to start before lunch on a seven-hour journey. When the London-Dover line *via* Ashford is electrified in 1962, one may hope for some acceleration of the present creditable 92-min. schedule between Victoria and Dover Marine. The Paris-Calais timings are not as fast as those of the "Flèche d'Or" when it was an all-Pullman train. The French National Railways would do well to cut them. The number of passengers who desire Pullman accommodation on the French is usually less than on the British side, because many people travel from and to Calais by the "Blue Train" and other sleeping-car expresses. Nevertheless the possibility should be considered of a specially comfortable fast train between Paris and Calais, similar perhaps to a "T.E.E." diesel set, but all-Pullman, to match its British counterpart. Many people travelling between London and Paris on business would welcome a faster surface route, offering considerable amenities, especially in the winter. It would help also if the immigration and customs formalities at the ports could be curtailed, and conducted in the boat trains on the British side.

Patterns of Passenger and Goods Services

MANY important points are made by Mr. H. Hoyle, Movement Officer, British Railways, Eastern Region, in an article "Making the Most of the Track" in the current issue of the *British Transport Revue*. Long-term planning, he explains, is essential for railway fixed equipment and rolling stock because of their high first cost and long life. Other forms of transport are not restrained in this way. There is also the more immediate problem of improving services so as to secure a greater share of the transport market now, "before the sands run out." Future planning must take into account the nature and extent of changes in industrial production and the use of leisure, particularly as they are likely to be reflected in the demand for transport. This necessitates constant planning of train services, bringing immediate improvements as and where possible, but always with the vision of something better, in the decades ahead.

Research already undertaken, and recent trends, he believes, suggest that British Railways traffic will develop in the following pattern: First, there will be more passenger travel, caused by increased prosperity and leisure, in which the railways must share. They can compete most effectively for the heavier streams of longer-distance travel and for suburban traffic in the larger population centres. Second, a progressive increase is to be expected in the use of oil and electricity for domestic and space heating and for producing power, with the power stations themselves burning less coal and more oil and atomic fuel. There will also be an increasing tendency to build coal-fired generating stations closer to coalfields and to distribute the end product throughout the grid. Long-distance transport of coal will be much reduced; Third, there may be an increase in the total output of iron and steel, but the extent to which greater demands for bridge and constructional work, for shipbuilding, light engineering and motorcar construction will be offset by improved production techniques in lighter steel alloys, and by developments in the plastics industry, is by no means clear. The chemical and plastics industries are expanding and there will be a great increase in the products of electrical and other light engineering. The railways must find a substitute for coal to replace a large part of the £120,000,000 revenue from coal last year. This must come mainly from increased merchandise carryings if Mr. Hoyle's forecast as to mineral traffic is correct. Merchandise receipts recently began to improve, but a big increase is necessary in any case to help put railway finances on a sound basis, apart from making good the decline in coal traffic.

Electric and diesel motive power in proportions not yet determined will replace steam. Mr. Hoyle observes that the predominant superiority of the former lies in two advantages: greater reliability, and the fact that electricity can be derived from home-produced small coal. But the misgivings of many people as to the future of oil supplies should be dispelled by the confidence of the British oil companies that supplies will be adequate in the foreseeable future. Reference to the remarks in this connection by Mr. Christopher Brunner, a Director of Shell-Mex & B.P. Limited, was made in our December 4 issue. Diesel locomotives and multiple-unit trains require rather less initial capital expenditure and can replace steam more quickly with less interference to current traffic operation. A fact which Mr. Hoyle rightly stresses is that much of the engineering work frequently associated with electrification is not directly concerned with it. Life-expired bridges would have to be replaced whether a route is electrified or not, while the straightening out of restrictive curves and the provision of deep ballasting, colour-light signalling and automatic warning devices are equally necessary to secure high speeds and more intensive line occupation with both forms of traction.

As to goods rolling stock a definite line of policy has not yet emerged other than the principle that the British Railways fleet must be reduced substantially, from 1,100,000 to 750,000 or thereabouts, and that the remainder must be much more intensively used. The speed of goods trains by common consent must be increased, but by how much and in relation to what, is still obscure. At the moment, he states, average speeds of 45 m.p.h., and maximum speeds of 60 m.p.h. are planned for merchandise trains, with 40 and 55 m.p.h. for mineral trains. For trains conveying merchandise, he rightly observes, such a target is much too low. For example, the

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London & North Eastern Railway and others of the former main-line railways imposed no speed limit on their No. 1 express goods trains. On long stretches of favourable track they averaged 50 m.p.h. Today, with better track standards and greater motive power, the pre-war performance should be surpassed. It is not a question of prestige, but of achieving a throughout transit time by rail which compares favourably with throughout road transit. New mineral wagons will have a maximum speed of 55 m.p.h., determined by the length of wheelbase. The modernisation plan envisages equipping all of them with automatic brakes and raising the speed of mineral trains to an average of about 40 m.p.h. So far, Mr. Hoyle states, results have been disappointing, but research and experiment continue. The outcome, it is to be hoped, may be a thoroughly reliable automatic coupler at a reasonable price, but if not the alternative may be to accept some compromise, still giving the facility to run mineral trains at speeds approaching the 40 m.p.h. necessary to make maximum use of the track.

So far as can be foreseen, he believes that British Railways must continue to operate at least four speed groups in future. First, the longer-distance day passenger trains which for competitive reasons must average about 80 m.p.h. The second, and what he considers by far the most important group, will include merchandise trains, passenger services on the more important secondary routes and night passenger trains on all routes with an average speed of close on 60 m.p.h. Third, the coal and mineral trains and all the short-distance goods "tripping" with maximum speeds of 55 m.p.h., and in the average 30-40 m.p.h. range. Fourth, there will be suburban and stopping passenger trains of electric and diesel multiple-unit stock.

From the point of view of track capacity it matters little whether the trains run at 10 or 100 m.p.h. provided they all run at the same speed. If, therefore, four speed groups are accepted as essential, the question immediately arises how far they can be assigned to separate tracks or routes, or if these alternatives cannot be made available, to what extent trains can be grouped according to speed. On most routes one speed group may be dispensed with and no route need have more than two speed groups during the night hours. Side-tracking must be avoided at all costs, because of the great deterioration in quality of service when trains have to be side-tracked several times to make way for faster running services. Transit times are extended and that the possibility of damage to wagons and their contents is increased by the incidence of stopping and starting. Crewing and locomotive costs are much increased. Side-tracking involves heavy maintenance charges for brake blocks and wheel tyres in destroying momentum, followed by additional fuel consumption in re-creating it.

The fast passenger speeds of up to 100 m.p.h. are intended for those heavy streams of longer-distance traffic particularly vulnerable to competition. They must not be introduced indiscriminately as was done before the war. One high-speed route for the through West Riding-London and through Sheffield-London traffic and not three, will be enough, he suggests, and maintains that much courage will be needed to resist "demands for ultra-fast expresses to cater for small streams of traffic over plain double track carrying a mixture of freight and passenger traffic". These, he urges, must be treated with suspicion and carefully costed in relation to track capacity and the effect on existing and potential goods traffic. The multiple-unit diesel trains which will replace most of the passenger services on secondary routes, provide services which he believes to be susceptible to erosion by the private motorcar and public road transport, and it is improbable that many of these will ever make a worth-while contribution to net revenue.

There is a good deal of optimism as to the ability of British Railways to run passenger expresses at average start-to-stop speeds of 75 m.p.h. Not enough thought has been given to the problem of running the fast trains, now found to be necessary, and slower trains on the same lines, though many railwaymen who have studied these problems are inclined to be more sceptical than is Mr. Hoyle as to the possibility of high speeds on a large scale. But speeds much higher than those obtaining at present are necessary to enable British Railways to compete successfully for traffic.

Improving Swiss-Italian Rail Links

DURING the post-war years the various governments concerned have given considerable attention to improving the rail connections across the frontiers of Switzerland, and the Confederation has made loans to other countries to enable them to extend electrification and its associated engineering works with this object, as in the case of the German lines on the right bank of the Rhine. Recently the Italian authorities published a statement covering the use of a 26-year Swiss loan of fr. 200,000,000, or some 28,650 million lire, to provide better communication between the two countries and improve access from the north to the port of Genoa. The interest and other charges so created, the rates of which are to vary over two periods of six and one of 14 years, first appeared in the Italian State Railways accounts for 1956-57; final repayment of the loan is due to be effected in the last 10 years of its term.

The scheme forms part of a plan for accelerating the train services to most parts of Europe and extending electrification to the principal Italian traffic routes. The work now particularly referred to involves two distinct but inter-related programmes. The first covers the electrification already completed on the 3,000-V. d.c. system, the Italian standard, as far as Luino on the Gallarate-Pino line. Beyond Luino the Swiss standard 15,000-V. 16⅔ cycles a.c. system is to be installed as the line will be operated by the Swiss Federal Railways thence and northwards from Pino to Bellinzona on the Gotthard line. In this way the three routes connecting Milan with Switzerland will thereafter be electrically operated throughout with consequent considerable benefits.

Between Gallarate and Luino, 29 miles, the line is double; the nine miles thence to Pino are single track. New high-voltage mains now connect the Laveno sub-station with the Vizzola company's supply system and the Gallarate sub-station, on the Milan - Arona line, has been enlarged. The electrification works, inclusive of those for the a.c. operated section, will cost 1,355 million lire, while signalling, telecommunications, general engineering and other improvements, excluding those needed at Luino Station, will cost 708 million. The second scheme is much larger and involves the conversion, also on the 3,000-V. d.c. system, of the present steam-worked routes from Alessandria through Novara and Oleggio to Arona, on the already electrified route from Milan to the Simplon, with the line leaving this one at Oleggio and running to Laveno through Sesto Calende, where it crosses the Simplon route.

The fact that these lines had been left steam-operated had resulted in the principal traffic from West and Central Switzerland being routed from Domodossola to Genoa, via Milan and Voghera, 173 miles, instead of being diverted at Oleggio through Novara and Alessandria, 146 miles, or being brought from Pino through Luino and Laveno to Oleggio and thence via Alessandria, some 131 miles. This second programme covers 43 miles of double and almost as much of single line, carrying an annual traffic of about 350 million gross *tonne*-kilometres. Electrification will cost about 3,560 million lire and involve 75 miles of new high-voltage transmission lines, new sub-stations at Valenza, Mortara and Novara, with new signalling, track renewals, and other improvements absorbing 4,620 million. Much of the work is well in hand and the rest has been placed on order. Electric services are expected to begin in June next year.

When the Simplon tunnel was opened as a single line in 1906 the route from Rho through Gallarate to Domodossola, then also single, became of first importance, and on the doubling of the tunnel in 1923 it became essential to double between Rho and Gallarate. By 1941 the Arona-Domodossola line was double, leaving the 16 miles from Gallarate to Arona as a single bottle-neck, the conversion of which was delayed by the war and resultant financial difficulties. Doubling is now in hand, with the aid of the Swiss loan, and involves a new tunnel at Vergiate and second viaduct of the River Strona. The second track in places follows a better alignment than the original. Heavier permanent way is to be laid all the way to Domodossola and 14 level crossings will be eliminated. Agreement has been reached with the Swiss authorities regarding the enlarging of the stations and sidings at Domodossola and Luino. At the former all-relay power working is to be installed. A new hydro-electric power station of some 45,350 kW capacity is being constructed underground at Monastero, on Lake Como, to supplement the existing one of some

6,000 kW., at Morbegno, higher up on the River Adda, with new dam there and associated works. The turbines and generators are on order, as are also the additional motor coach trains and locomotives required for these new electrified services, which are confidently expected to contribute to a considerable development of the traffic between Italy and Switzerland.

New Zealand Government Railways in 1958-59

THE report on the New Zealand Government Railways for the year ended March 31, 1959, has been signed by Mr. G. W. Brown, Acting General Manager in the absence of Mr. A. T. Gandell, the General Manager, who was overseas on official business at the time the report was prepared. Mr. Brown states that the policy of attracting business and holding expenditure was continued and intensified throughout the year with satisfying results. Despite the fact that certain freights decreased in tonnage, new and increased business in other directions more than compensated so that in the final results the total tonnage carried showed a slight increase over the previous year.

From the expenditure-savings viewpoint the emphasis was on improved efficiency in day-to-day operations. During the year many alterations and rearrangements of goods services were made to meet the changing pattern of traffic movement and to achieve financial savings. The broad effect of this reorganisation was a considerable speeding up in the movement of long-distance goods, an improvement in the turnround of wagons, and a reduction in the amount of yard shunting. These efforts were reflected in a reduction in goods-train miles despite increases in gross and net-ton miles, an increase in the average goods-train load, and an increase in the average speed of goods trains.

By these and other means it was possible during the year not only to avoid rising costs but actually to effect an overall decrease in the face of considerable increases in specific items.

The principal financial and other results of the year's working are given below:

	1957–58	1958–59
	Millions	
Passenger journeys	24·82	25·44
Goods tonnage	9·71	9·72
Total train-miles (revenue)	14·83	14·60
	£ millions	
Coaching traffic earnings	3·44	3·42
Goods traffic earnings	25·85	25·71
Total Revenue	34·44	34·37
Expenditure	35·59	35·17
Net revenue or loss	−1·15	−0·76
Interest charges	4·87	5·19

As shown above, operations for the year resulted in a deficit of £764,441, this being £380,986 less than the previous year. Gross revenue decreased by £69,905 or 0·20 per cent, the main reduction being in rail-goods revenue with some offsetting increases in revenue from subsidiary services and non-operating revenue. Gross expenditure for the whole undertaking amounted to £35,137,305, a decrease of £450,891, or 1·27 per cent. There were decreases in all headings of expenditure except renewals and depreciation, and this despite particular increases in some unit costs.

The total number of passenger journeys increased by 620,444, or 2·50 per cent. This was due to an increase of 732,460 suburban journeys, offset to some extent by a decrease of 112,016 in non-suburban journeys. Increased suburban traffic was experienced in all four main centres, but more especially at Wellington.

Goods revenue at £25,710,181 declined by £136,728 or 0·53 per cent. This position was brought about by the fact that in the North Island there was an increase of 148,507 tons of short-haul log traffic on the Murapara line, but a substantial decrease in other long-distance traffic; consequently, in the final result, although there was an overall increase in tonnage the net ton-miles decreased by over 2,250,000, and a revenue decrease resulted. In the South Island, on the other hand, there was a greater increase in net ton-miles (9·3 million, or 2·69 per cent) than in the tonnage (1,629 tons, or 0·04 per cent) and a revenue increase resulted accordingly.

The progressive increase in the use of diesel-electric locomotives for all-purpose haulage and railcars for passenger traffic effected a large decrease in steam-train mileage. As a result the consumption of coal decreased by 29,583 tons and the cost decreased by £134,107. In the case of fuel oil the unit costs per ton decreased and although there was a small increase in consumption the total cost decreased by £103,855; similarly, in the case of diesel fuel the total cost decreased by £18,813 despite an increase in consumption of 275,095 gal. Increased rates for electricity applied from April 1, 1958, and the increased cost totalled £59,602 although electric locomotives and multiple units ran 3,712 miles less than last year.

During the year substantial additions to the stock of wagons were made. In the North Island additions totalled 1,330 as against 910 written off. In the South Island the increases were 603 as against 464 written off. Approval was given during the year for a wagon-building programme which made provision for the supply over the next few years of a total of 3,188 wagons of all classes. Arrangements for construction are being pushed ahead so that the wagon capacity will keep pace with all anticipated demands.

The main-line fleet of diesel-electric locomotives remained at 107, and these continued to handle an increased share of the traffic. In the North Island the change-over from steam to diesel is illustrated by the fact that the proportion of gross-ton miles (excluding railcars, electric locomotives, and multiple units) hauled by diesel-electrics increased from 7 per cent in 1954-55, to 20 per cent in 1955-56, to 42 per cent in 1956-57, to 48 per cent in 1957-58, and to 53 per cent for the year under review. Diesel shunting power is being constantly augmented, and during the year five new 150-h.p. diesel shunters were put into service, while 10 more are on order.

A History of Tanganyika and its Railways

ANOTHER and most remarkable book has now been written by Mr. M. F. Hill entitled, " Permanent Way : Volume II." This title is somewhat misleading and wholly inadequate, for it is a comprehensive history not only of the railways in Tanganyika, but also of that territory generally. It is reviewed on another page, but the following are further side-lights upon it. So wide is its coverage that as a history of Tanganyika it goes back to about 600 B.C. when the then-Pharaoh ordered the Phoenicians to circumnavigate the African Continent. This they duly accomplished within a period of three years, starting by visiting the east coast and returning *via* Gibraltar and the Mediterranean. In fact, early history claims so much attention that in the initial one-fifth of the volume there is practically no mention of railways.

However, with the establishment of the German Protectorate in the middle 80's, land communications began to be considered and by 1887 a series of railway reconnaissances and surveys was initiated from Dar es Salaam, of national prestige. At any rate, the book gives a vivid picture of successive political developments and of the spheres of influence of the Great Powers in East Africa throughout the period of German occupation. Incidentally, and contrary to the generally-assumed efficiency of the Germans, particularly in technical matters, this work throws light on their failures in the earlier days both as railway surveyors and constructors, and on the obstinate refusal of the authorities to recognise the value of obviously-favourable routes for their new lines.

Later, however, when more-experienced officers and contractors were employed better work and more rapid progress resulted. For instance, though it is true that the Central line from Dar es Salaam was constructed through flat, easy country, the rate of progress beyond Tabora averaged 266 km. a year, thanks largely to mechanical platelaying. The principal achievement on that line was the bridging of the Malagarasi River; its main through-truss 164-ft. span was floated out to site.

Some 60 pages of the volume are devoted to a description of the East African Campaign of the 1914-18 war. The severe defeat of the initial British attack on Tanga due to lack of military intelligence is not glossed over, but warm tribute is paid to the magnificent achievement of the technical troops, mostly from India. Special mention is made of the fact that, although the German demolition was not always effective, some 300 miles of line were repaired in about three months. In this connection it is noteworthy that a number of M.C.s and other decorations were conferred on officers of the Indian railways for their work in Tanganyika.

Passenger Traffic in the U.S.A.

(*By a correspondent*)

ANY suggestion that railways of the U.S.A. as a whole want to get out of passenger business finds little support in the opinions recently expressed, of some senior railway officers. Many of the principal long-distance trains, it is reported, still pay their way. The "Golden State Limited" of the Rock Island and Southern Pacific has been earning up to $8 a mile. The "Denver Zephyr" of the Burlington Lines carried 2·7 per cent more passengers in 1958 than in 1957; and the "Broadway Limited" of the Pennsylvania is still popular enough to be restricted to Pullman passengers between New York and Chicago.

The losses on operation are chiefly in the secondary trains, on branch lines, and in suburban services. Even in the last-mentioned, the Chicago & North Western, by its recent introduction of gallery type double-deck cars, push-and-pull working, and the closing of certain stations in the inner ring of the Chicago suburbs, has at last succeeded in putting its services on a paying basis.

Fare and sleeping car concessions have brought considerable traffic back to the railways. Reduced first class fares on the Rock Island have resulted in traffic increases of 35 to 112 per cent in certain months. The acceptance of tickets at "coach" fares in sleeping cars has increased sleeping car business to and from Kansas City by 50 per cent. The same steps taken on the "Western Star" of the Great Northern Railway increased Pullman business by from 29 per cent in February to 55 per cent in April and by the same means the Missouri Pacific has brought about an increase of 52 per cent in Pullman revenue between Houston and New Orleans.

Both the Burlington and the Baltimore & Ohio have been running their "slumbercoaches" for coach passengers regularly occupied almost to capacity and at a profit; the B. & O. has more of these cars on order. Care is taken that the sleeping car concessions to coach fare passengers do not cut unduly into first class revenue. That is why certain concessions are made in the winter only, and not during the summer peak travel period.

These are only indications of some turn in the ebbing tide of American passenger patronage. Last year the Pennsylvania Railroad had operating expenses of $204,800,000 to set against revenues of $166,500,000, a loss which whittled away most of the $56,000,000 net receipts in freight operation. The New York Central System has brought its passenger operating ratio down from 125·18 in 1957 to 112·24 in 1958, but here again it is impossible to be complacent.

All railways are continuing, when Interstate Commerce Commission approval can be obtained, to prune the services which are steadily losing money. Some lines aim at getting out of the passenger business altogether. They include the Maine Central and Bangor & Aroostook. The former has been badly affected by the increasing dependence of the connecting Boston & Maine on "RDC" railcar operation, which is making it difficult to operate through coach and sleeping car services between Boston and towns served by the Maine Central.

As regards American railways in general everything possible is being done to make passenger travel more attractive and profitable. Besides the admission of coach passengers to Pullman sleeping accommodation, reduced fares have been tried with success in different areas. Less elaborate and cheaper meals and refreshments have been introduced on an extensive scale. The Chicago & North Western, for example, has cut its fares by the "Twin Cities 400", to and from St. Paul and Minneapolis, and the "Dakota 400" to the bus fare level over the same routes, and is also providing cheaper meals. In the off-season, to reduce operating expenses, trains hitherto exclusively Pullman are being combined with trains conveying coach passengers as, for example, the Santa Fe "Super Chief" and "El Capitan" between Chicago and Los Angeles.

LETTERS TO THE EDITOR

(*The Editor is not responsible for opinions of Correspondents*)

Czech-built Locomotives in Persia

October 27

SIR,—The 0-10-0 locomotive illustrated in the Scrap Heap of October 23 was one of a numerous class of two-cylinder compound engines built for the Austrian State Railways (K.K. St. B.) between 1909 and 1915 and known as Class 80. One hundred-and-forty were built, mostly by Austrian firms, numbered 80.01—80.36 and 80.100—80.203. Nos. 80.126—80.131 of 1912-13 were, in fact, the first locomotives to be built by Breitfeld Danek. The same firm also contributed Nos. 80.140—80.149 and 80.174—80.196. The last of these carried the maker's No. 54, as shown in your illustration.

In 1937, 10 of these engines, numbered 80.14, 17, 37 (old No. 02), 110, 126, 130, 131, 167, 194, and 196, were transferred to the Trans-Iranian Railway to assist in construction work. They retained their old numbers, but by 1942 only Nos. 131 and 196 were left in stock and these two did not last very much longer.

Yours faithfully,

H. C. HUGHES

186, Cheston Avenue, Shirley, Croydon

Signal Warning Boards

December 1

SIR,—From the evidence before the inquiry into the recent collision at East Ham on the London Tilbury & Southend line and the report on the 1958 Dagenham accident, it is clear that the presence of A.T.C. warning apparatus at the distant signal does not help the driver to observe an adverse home signal in dense fog. Having received the warning, the driver still has to rely solely on his eyesight and knowledge of the route to find the home signal.

But in many European countries, even in Italy, where visibility is normally very good, it is the practice to mark the approach to signals by a succession of striped warning boards. These boards are situated at eye level and are spaced at about 50-yd. intervals, usually three or five in number with the stripe pattern "counting down" to one.

To my knowledge, the only example of these boards on British Railways is situated at the down home signals at Esher, Southern Region, where there are three small and rather closely-spaced markers. There are many possible variations in the number, size, and siting of the boards, and this inexpensive aid to safe movement in fog seems worthy of more extended trial on lines not yet equipped with colour light signalling.

Yours faithfully,

J. N. FAULKNER

53, Westfield Road, Surbiton

Cross-country Diesel Services

November 30

SIR,—I refer to the letter from Mr. D. V. Cheney in your November 27 issue. Another through train which has suffered is the Margate—Birkenhead. In this case I believe that the reason is that the Western Region could not find a path for it, because of the diversion of London-Birmingham trains to the Western Region route. But they seem to expect to find a path next summer.

There are probably two reasons for curtailing the York-Bournemouth service at Banbury. One, as your correspondent has suggested, is that the revenue derived from the service by any one Region may well be insufficient. The other is that the Western Region is short of enginemen because of some revival in freight traffic and of the diversion of Birmingham trains from the London Midland Region route.

Yours faithfully,

J. B. LATHAM

Channings, Kettlewell Hill, Woking

THE SCRAP HEAP

Lucky " Angel "

Railway clerk Valentine Ramsey (pay barely £12 a week) went to the Princes Theatre last night to see the show he has backed with " everything I had in the kitty." That is £2,000—a legacy—and with it Mr. Ramsey bought one-sixth of the new musical " Kookaburra." And he hopes that by Christmas his investment will be earning around £200 a week.—*From the " Daily Express."*

Calling a Halt

The whole village of Teston smoulders with resentment. Everyone feels the victim of bureaucracy gone mad. Teston, separated by a luscious orchard from the brewing town of Wateringbury is described in official annals as a " vil. with ry. sta." And that is the trouble. There is no " ry. sta." There was one once. Two respectable wooden platforms, with huts to match. . . . The Southern Region announced that the halt was unprofitable and would be closed. There was an epidemic of dismay. Mr. Sheppard, the shopkeeper, protested: " What about the hop-pickers? Fifty a day during the season!" Mrs. Herbert of the Maidstone Council was vociferous. " The railways are run by public money. What about our share?" But the station closed. Today, trains whip through as if it never existed.—*From the " Evening Standard."*

First All-Roller-Bearing Locomotive

The completion early in 1958 of the substitution of steam by diesel traction on the Northern Pacific Railway of U.S.A. caused the scrapping of what is believed to be the world's first all-roller-bearing locomotive, N.P.R. No. 2626, shown in the accompanying illustration. This was built by the American Locomotive Company for the Timken Roller Bearing Company, and was tested on 12 U.S.A. railways in 1930-33 before being acquired by the Northern Pacific in 1933. It was the first of many engines with roller bearings owned by that railway. On completion of its last run in the autumn of 1957, No. 2626 had completed nearly 2,250,000 miles. During the three years of test running it bore the Timken No. 1111.

Rail/Air Service for Pigeons

Racing pigeon traffic to the Continent *via* Blackwater Station, Southern Region, and Blackbushe Airport increased this year. During three summer months 1,780 baskets were dealt with, from Newcastle and other northern towns to Lille, Orleans, Bourges, and Pau. Southern Region conveyed the pigeons from the station to the airport.

Sitting Tight

In a recent issue of the *West Sussex Gazette*, a London correspondent expressed his gratitude to the station staff at Arundel who with difficulty and determination succeeded in releasing the passenger's dog from beneath a seat in a compartment of the 10.02 a.m. train from Victoria to Bognor Regis. The dog, a corgi, had curled up under the seat during the journey, and had become so tightly wedged that it took the combined efforts of four of the staff (with eight minutes' delay to the train) before the animal was released.—*From " British Railways Magazine," Southern Region edition.*

S.R.—and " Condor "—to the Rescue

Prompt action by staff of British Railways, Southern Region, enabled breathing apparatus to be sent quickly from Surrey to the National Coal Board at Coatbridge after the colliery disaster at Auchengeich on September 18. At 4 p.m. on that day Siebe, Gorman & Co. Ltd. of Chessington telephoned Surbiton Station requesting a container and stating that it would take 1½ hr. to load. The Chief Goods Clerk, Mr. W. J. Daw, at once arranged with the London Midland Region for departure of the " Condor " container express goods train from Hendon to Gushetfaulds (Glasgow) to be delayed if necessary until 7 p.m. It was now 4.30. Motor Driver F. D. Bailey, who had just heard what was required, immediately agreed to take the container to the Siebe, Gorman premises, load up, and go direct to Hendon. He left Chessington at 5.45 and, with a special police escort, arrived at Hendon at 6.30.

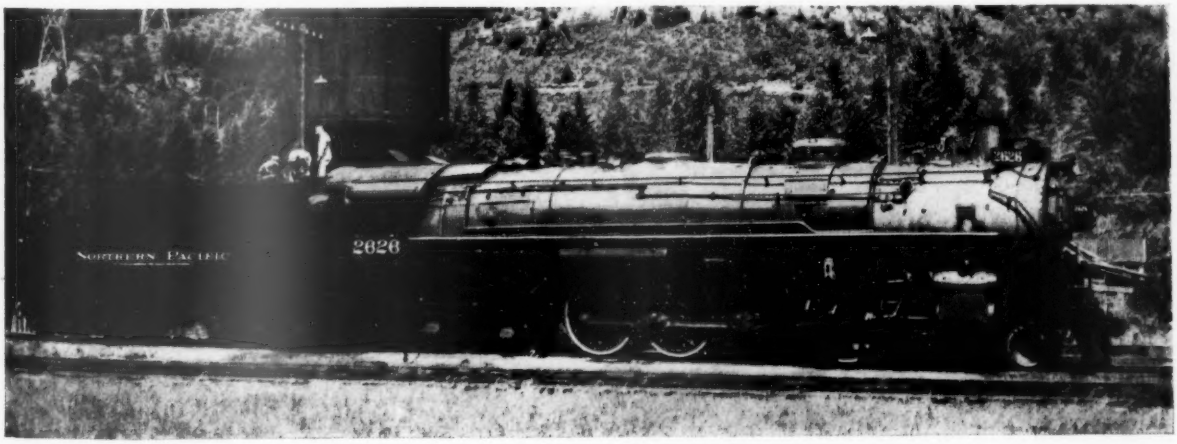
Cambridge Station a Monument

Not the most determined devotee of Victoriana is likely to equate [Cambridge] railway station, originally designed by Sancton Wood and opened on July 29, 1845, with King's Chapel. Yet the station, to which most visitors would hardly give a glance, is " of interest as an early railway building and notable for the application of an Italianate style to new and entirely functional architectural requirements, with original and distinctive results." It is certainly worth its place as " Monument (85)" and of its modest three-quarter-page description. Incidentally, it is curious to notice that it is almost exactly co-eval with the Fitzwilliam Museum, so that one of the latest and most effective manifestations of the classical spirit and one of the first buildings of the age of speed meet in time at Cambridge.—*From a " Times " review of " An Inventory of the Historical Monuments in the City of Cambridge "* (*H.M.S.O.*).

Red Carpet Days

Alas, the chance to stand and stare
Is now most lamentably rare.
The courtesies to potentates
And other worthy heads of States
All too infrequently illume
Victoria's Royal Waiting Room,
But, still, at times, there comes a chance
Of watching pomp and circumstance.
Dynasties change, name follows name,
The *protocol* remains the same.
Anxious, but outwardly serene,
Top-hatted gods of the machine
Sigh as the special train comes through
And nestles down at Platform Two,
And, quite the most relieved by far,
Is our old friend the *chef de gare.*

A.B.



Northern Pacific Railway No. 2626, *formerly Timken No.* 1111, *believed to be the first locomotive in the world to be fitted with roller bearings throughout*

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

WESTERN AUSTRALIA

First Locally-built Railcar

Of the 10 diesel railcars being built at the Midland Junction workshops of the W. A. G. R. the first was recently placed in service in the Pertti area. It is powered with two 150-h.p. engines, and it is stated that cost of production is about £A42,000. The other nine cars are expected to be turned out at the rate of one a month.

VICTORIA

Government Railways' Stores Purchases

Among the items upon which the Victorian Government Railways spent some £A11,000,000 in 1958-59 were diesel-hydraulic locomotives, £A800,000; diesel-electric locomotives, £A720,000; diesel fuel oil, £A550,000; diesel furnace oil, £A400,000; wheels £A200,000; and rails and other civil engineering requirements, £A1,500,000. In addition, production at the four railway workshops was valued at £A4,500,000. Only £A1,500,000 were expended on imported articles, £A9,500,000 being the value of indigenous purchases.

Track Relaying

Mechanised equipment is being used by the Government Railways to accelerate the track relaying programme on several country lines. Good progress is being made with track relaying work from Sunshine to Serviceton on the Melbourne-Adelaide line on which run "The Overland" and other important passenger and fast freight trains. The existing 80 lb. rail is being replaced by welded rail, generally 94 lb., but some sections are 107 lb. rail.

Track relaying work on this line is completed from Sunshine to Deep Lead and from Wal Wal to Pimpinio, and work is now in progress on the 14-mile section between Deep Lead and Wal Wal. When all the heavier welded rail is laid, the maximum permissible speed of passenger trains on this line will be 70 m.p.h.

On the Mildura line, the existing 80 lb. rail is at present being removed from the Mallee section, near Ouyon, and replaced by longer welded rail of similar weight. Existing sand and gravel ballast is being levelled off and the track is being reballasted with crushed rock.

Between Foster and Yarram on the south-east Gippsland line, 60 lb. rail has been replaced by welded 80 lb. rail. Ballasting is now being completed. The 60 lb. rail between Fairley and Swan Hill is now being replaced with 80 lb. welded rail and the track reballasted.

NEW ZEALAND

New Bridge Design

For many years new railway bridges in New Zealand have been built almost invariably to a similar pattern, with steel spans carried on reinforced concrete piers. The steelwork inevitably requires repainting at intervals, a recurring maintenance cost, and the search has continued for new techniques that will reduce these annual costs. As a development of this research, a new bridge to be built across the Ashley River just north of Rangiora in North Canterbury will comprise continuous concrete slabs.

This is a new form of bridge construction, and it will be the first railway bridge of this type in New Zealand. The spans will be a rectangular section of solid reinforced concrete 6 ft. 6 in. wide and 3 ft. 9 in. deep, each slab covering three of the 40 ft. spans. There will be 45 spans altogether, giving a total length of 1,800 ft.

Carried on concrete piers, each supported by three 50-ft. long 24-in. dia. octagonal reinforced concrete piles, the new Ashley Bridge will be located a short distance downstream from the present bridge. Timber runners bolted to the concrete deck will have the track sleepers fastened to them. The new design, with a very favourable first cost, is expected to result in a marked reduction in annual maintenance expenditure.

WESTERN GERMANY

Munich-Lindau Diesel Traction

The Munich-Lindau (Lake of Constance) main line, double-track and 142 route-miles long, is the only main line in Baveria which has not yet been electrified. Because of its comparatively sparse passenger and goods traffic it is not likely to be included in any electrification programme for a number of years. On the other hand, the German Federal Railway is considering the opportunity of introducing diesel traction on the line for both passenger and goods services with a view to reducing travelling times.

Crossing Barrier Installation

There are still some 18,000 level crossings over main lines in Western Germany. Many have flashing light warning signals but at others lifting barriers are provided, controlled in various ways. In some cases their satisfactory operation offers special problems. An example of this is seen at Ingolstadt, where a new installation of power operated barriers with push-button control recently has been provided to cover the point where a newly widened roadway traverses the single-line railway connecting Ingolstadt with Donauwörth. The eight barriers are of special lightweight construction in aluminium alloy; four are about 33 ft. long and cover the highway, while the remainder are somewhat shorter and fall across the cycleways and pavements. Counterweights have been expressly avoided for clearance and aesthetic reasons and the barriers are

Electrically-operated crossing barriers at Ingolstadt, showing separate booms covering cycleways and pavements

Control panel and diagram for working crossing barriers

equalised by special spring mechanisms. The installation, which was furnished by Siemens & Halske A.G., from their Braunschweig works, presents a very neat appearance, the barriers being hardly noticeable in the normal position. The gateman controls the working to the best advantage, guided by electric announcement of the approach of trains, so as to cause the least possible delay to road users.

ITALY

Rail Link with Fiumicino Airport

The new inter-continental airport, Fiumicino, to the west of Rome, on the Mediterranean coast just north of the mouth of the Tiber, is to be connected by a short railway link branching off from Porto Station on the local line for Fiumicino which bifurcates at Ponte Galeria from the Rome-Pisa main line, 14 miles out of Rome Termini Station. Porto is the only intermediate station between Fiumicino and Ponte Galeria.

Motorcars Through Simplon Tunnel

Because of the lack of facilities at Iselle di Trasquera Station, the first station close to the southern exit of the Simplon Tunnel, 12 miles north of Domodossola, motor vehicles to be conveyed by rail on the Simplon route to or from Brigue have had to be loaded on, or unloaded from the special motor vehicle trains at Domodossola, 26 miles to the south of Brigue. Motor vehicle loading and unloading ramps have now been installed at Iselle, and were placed in service on December 1; on the same day, new ramps were in use at Brigue Station. The rail transport of motor vehicles *via* the Simplon Tunnel, has, therefore, been reduced to the Iselle—Brigue section, 13 miles, from the former Domodossola - Iselle - Brigue section, a distance of 26 miles. From the same day, passport formalities for drivers and passengers of the motor vehicles, the ticket booking facilities and the customs formalities were transferred from Domodossola to Iselle. In the Brigue—Italy direction, too, all these services are being performed at Iselle.

FRANCE

Self-drive Car-hire at Lyons

Since its introduction at Lyons in 1951, considerable progress has been made in the self-drive car-hire service available to passengers arriving there by train. The number of car-hire days in 1958 was 5,570, compared with 4,872 in 1957 and 1,749 in 1954; this increase is attributed to the quality of the cars which are renewed each year, and the service provided.

Alterations at Paris-Montparnasse

As a result of studies undertaken jointly by the city authorities and the S.N.C.F., sweeping changes are planned for the Paris-Montparnasse Station. The changes to the layout of the station itself are but part of an overall project to modify radically the layout of that quarter of Paris. For the S.N.C.F. the work, which has already commenced, comprises the complete withdrawal southwards of the station facilities within an area bounded by the junction of the Avenue du Maine and the Boulevard de Vaugirard; at present certain sidings and offices are located north of this point. The S.N.C.F. will also give up land and facilities to the east and west of the station proper. Existing premises on the land vacated, together with those on surrounding city land, will be demolished and the vacant space given over to the building of modern stores and business premises, a swimming bath, meeting rooms, garage space and a 607-ft. skyscraper, part of which will be occupied by a hotel. Although the total cost will be of the order of £50,000,000, the actual cost of the S.N.C.F. will only be just over £1,000,000 with a slightly lower outlay by the Paris authorities; the balance of the cost will be met by the sale of land.

Movable Head-rests

The S.N.C.F. has devised a movable head-rest for use in second class compartments, which can be located in different positions at the back of seats according as to whether three-a-side or four-a-side seating is desired. The unit comprises a movable support fixed to a frame, the head-rest proper fixed to this support and a device to enable it to be moved. The frame runs on rollers along guiding rails located behind the back of the seat, the head-rest being connected at top and bottom to this frame. The frame is normally held in position by a rubber pad pushed by springs against the wall of the compartment. Operation of a small lever releases the springs and makes it possible for the head-rest to be moved.

HUNGARY

Budapest Eastern Station Rebuilding

Budapest Eastern Station, the arrival point for trains from Western Europe, is being rebuilt and modernised at a cost of 25,000,000 forints (some £750,000). When work has been completed in 1961, modernisation of the Western Station will begin.

Publications Received

Directory of Railway Officials & Year Book, 1959-1960. London: Tothill Press Limited, 33, Tothill Street, S.W.1. 8½ in. × 5¼ in. 616 pp. Price 60s.—The most important new feature is a section giving details of suppliers of signalling and interlocking equipment throughout the world. These are grouped first under the countries in which the offices and works are situated, with brief indication of their products; and in a further section suppliers are grouped under the type of product (*e.g.*, block signalling apparatus, level-crossing gates and warning signals, A.T.C. and train stops, C.T.C. and remote-control systems, marshalling yard equipment). Publication is somewhat later in the year than usual because of the printing dispute last summer, but the opportunity has been taken to revise the contents to September. The entries for the British Transport Commission and the several Regions of British Railways have been substantially revised. The particulars of locomotives and rolling stock represent the position at the latest practicable date, June 14. The list of principal electrically operated railways has been further amplified. To facilitate reference, divider tabs have been introduced at the beginning of principal sections, and the contents have been rearranged more particularly in the latter part of the book, to bring all related matters under the appropriate subject tab.

Permanent Way: Volume II.—The Story of the Tanganyika Railways. By M. F. Hill. Published by East African Railways & Harbours, and printed by Hazell, Watson & Viney Limited, London. 10 in. x 7½ in. x 1¼ in. 295 pp. Fully illustrated. Price 25s. This finely produced and profusely illustrated volume is far more than a bare story of the railways in Tanganyika. It is a history of the country from 600 B.C. or earlier, and in its first 60 pages there is practically no mention of railways. During the German occupation dating from 1885 there were abortive surveys from Dar es Salaam, but it was not until 1891 that a German company began building a line from Tanga of metre gauge. Due to inefficient survey and construction the 200 miles to Moshi were completed only in 1912. Meanwhile, construction of another line from Dar es Salaam had been begun in 1905, but due to faulty policy progress was at first slow. Tabora was reached by 1912 and Kigoma on Lake Tanganyika by February, 1914.

Then came World War I, and the East African Campaign is described in some detail. Here again Mr. Hill devotes about 60 pages to this period, and pays great tribute to " the magnificent achievement of the technical troops "—largely Indian railway staff of all grades. By the end of 1916 the country had been occupied by British forces. The latter part of the book describes subsequent rehabilitation and general improvement of the railways, and outlines the Hammond Reports, the development of the country, projected extensions—including the Voi-Kahe link between the Kenya and Tanganyika lines—and progressive locomotive developments. In fact, the post–1918 history is written chronologically and under successive general managers, whose portraits are given. The whole volume is undoubtedly an outstanding work of the greatest historical value. Some of the side-lights it reveals are mentioned in an editorial article on another page.

XUM

The Riding Properties of Bogie Vehicles—2*

Theoretical prediction of railcar and locomotive riding performance as an aid to the rationalisation of bogie design

By J. L. Koffman

AS shown in Fig. 3, low ride index values can be achieved by keeping down the natural frequency and/or the amplitude of the oscillations. Enough has been said about the ways and means of keeping the frequency low(8), but as far as the amplitudes are concerned a brief mention may be made here of the amplitude ratio R as applied to a simple linear system consisting of a mass, a spring with a linear force-displacement characteristic and a viscous damper the resistance of which is proportional to the displacement velocity, Fig. 9. This is the ratio of the displacement of the body divided by the displacement originating the oscillation. The value of R will be at its highest at resonance, reducing to unity at a frequency of 1·41 times the natural frequency of the system. Thus with impulses coming at 60 ft. intervals and a natural frequency of the system of 1·5 cycles/sec. the resonance speed will be at 1·5 x 60/1·467=61·3 m.p.h. Reduced natural frequency will not only reduce the resonance speed but also the acceleration. The magnitude of the acceleration is given as $b=e(2\pi f)^2$, where e is the amplitude.

The importance of suitable viscous damping is clearly indicated on Fig. 9 and attention is drawn to the fact that the presence of dampers is undesirable at speeds in excess of 1·41 of the resonance speed. For a number of reasons substantiated both theoretically and experimentally(8), the value of D=0·2 to 0·25 should be aimed at where for a single mass system $D=p/2\sqrt{mc}$ with p (lb. sec./ft.) as the damping resistance, m (lb. sec.²/ft.) the mass, and c (lb./ft.) the spring stiffness. The relevant equations for a two degree of freedom system applied to the suspension of vehicles have been considered previously (10a).

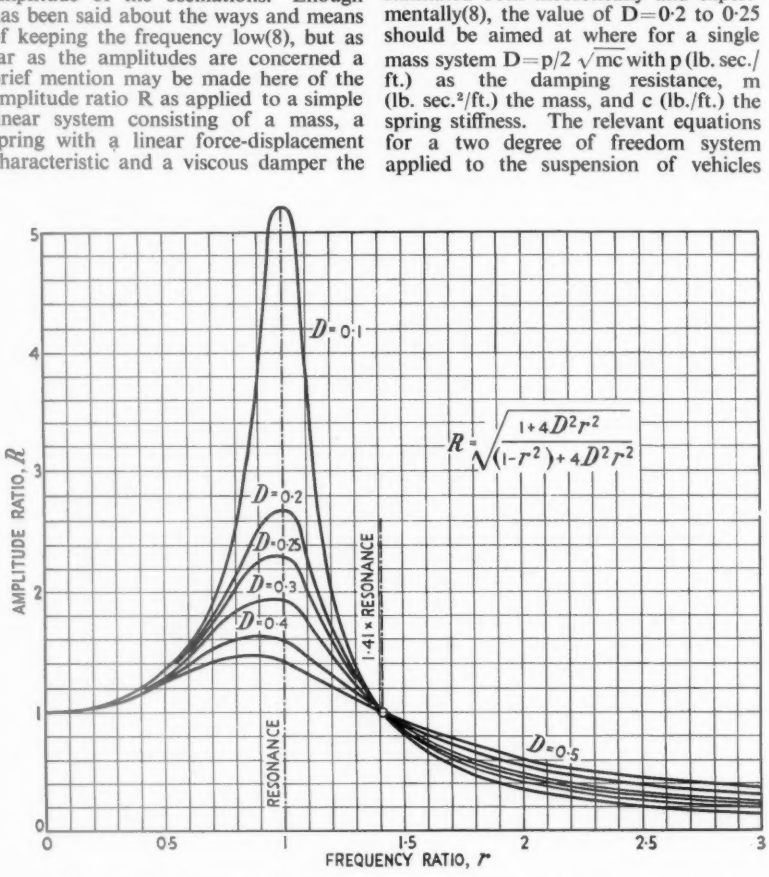


Fig. 9—The effect of viscous damping on the amplitude ratio of a simple linear system

So far as vertical oscillations are concerned, we are faced with bouncing and pitching and of these the latter is more important. The natural frequency of a symmetrical vehicle body pitching about the lateral (Y) axis through its centre of gravity is obtained from the formula :—

$$f=\frac{a}{6{\cdot}28}\sqrt{\frac{c}{I_y}}$$

where 2a (ft.) is the distance between bogie centres, c (lb./ft.) the total spring stiffness and I_y (lb. ft. sec.²) the moment of inertia about the Y-axis. Generally the value of I_y is obtained from:—

$$I_y=m(xL)^2$$

where L (ft.) is the body length over the buffer beams, whilst x=0·22 to 0·25 for diesel and electric locomotives, 0·33 for coaches, and 0·28 for railcars with underfloor engines. If the body pitches about one of the bogies then :—

$$I'_y=I_y+2ma^2$$

Similar considerations apply to the body hunting on the swing links or similar devices, about the vertical (Z) axis through the centre of gravity. In this case it will be sufficiently accurate to assume $I_z=I_y$.

Thus if the magnitude of the excitation amplitudes and the natural frequency and the damping factor of the system are known, it will be possible to determine the magnitude of the ride index values. For example, with a natural frequency of pitching $f_p=2{\cdot}5$ and an excitation impulse every 30 ft. the ride index values can be determined along the lines shown in the upper table, assuming the amplitude of excitation e=0·06 in. at the bottom bolster plank and a damping factor of 0·25(11).

The data shown relate to heavily damped primary springs and bolster springs with a static deflection of 2·64 in. Increasing the latter value to 4 in. will reduce the frequency of pitching to 2·03 cycles/sec. Proceeding as before, the revised figures are shown in the lower table.

The advantage thus obtained amounts to an index reduction of about 0·5, in this case improving the quality of the ride from just satisfactory to satisfactory. It is of interest to compare these results with experimental evaluation, Fig. 10.

Similar considerations apply to the ride in the lateral plane as far as body nosing, *i.e.*, rotation about the vertical (Z) axis

Speed (m.p.h.)	30	40	50	60	70	80	
Freq. of Excit. f (c./s.)	1·467	1·96	2·44	2·934	3·42	3·92	
f/f_p	0·585	0·853	0·975	1·175	1·37	1·57	
Ampl. Ratio R	1·42	2·16	2·3	1·67	1·06	0·76	From Fig. 9
exR (in.)	0·085	0·13	0·138	0·1	0·064	0·046	
Acceler. g.	0·019	0·051	0·084	0·088	0·077	0·071	$b=\frac{e(2\pi f)^2}{386}$
Ride Index	2	2·8	3·2	3·45	3·35	3·35	From Fig. 3a.

Speed (m.p.h.)	30	40	50	60	70	80
f/f_p	0·725	0·967	1·2	1·445	1·68	1·92
Ampl. Ratio R	1·76	2·3	1·6	0·94	0·65	0·48
e x R (in.)	0·105	0·138	0·096	0·0565	0·039	0·024
Acceler. g.	0·023	0·054	0·058	0·05	0·047	0·047
Ride Index	2·1	2·8	2·95	2·92	2·9	2·9

* Part 1 appeared in our issue of November 27

through the centre of gravity and displacement along the lateral (Y) axis through the centre of gravity is concerned.

The lateral oscillations of the vehicle body considered here are assumed to be caused by the sinusoidal motion of the wheels. The actual frequencies of these oscillations are plotted in Fig. 4, and also in Fig. 5 of Ref. (8). The bogies usually follow each other along the track, the rear one following the front bogie with a phase angle ϕ. Fig. 11. The wavelength L (ft.) of the sinusoidal motion L corresponds to one complete cycle (2π) while the distance a (ft.) between the bogie centres corresponds to ϕ (12) and since: —

$L/a=2\pi/\phi$, it follows that $L=2\pi a/\phi=v/f$ and $\phi=2\pi af/v$, where v (ft./sec.) is the vehicle speed. The body rotates about the vertical (Z) axis through the centre of gravity, the relevant angle being:

$$\psi=z/(a/2), \text{ where } z=(\sigma/a)\sin\phi/2$$

where σ is the clearance between the wheel flanges and the rails, $\sigma/2$ being

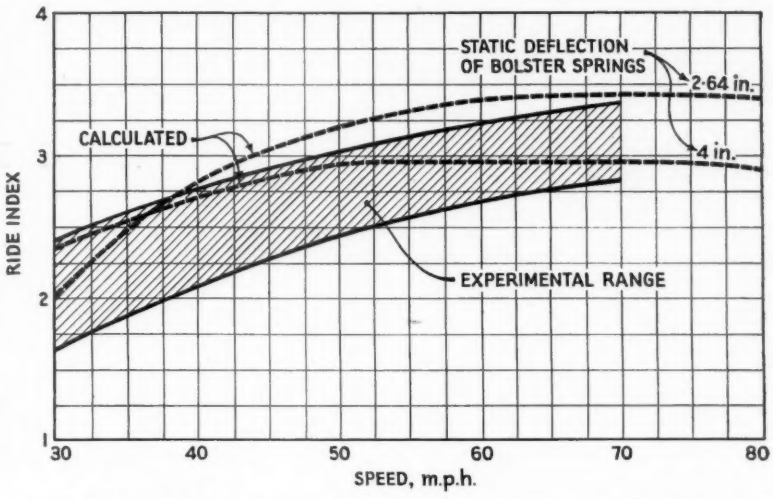


Fig. 10—Vertical ride index values for a railcar trailer. The importance of ensuring adequate bolster spring deflection is apparent

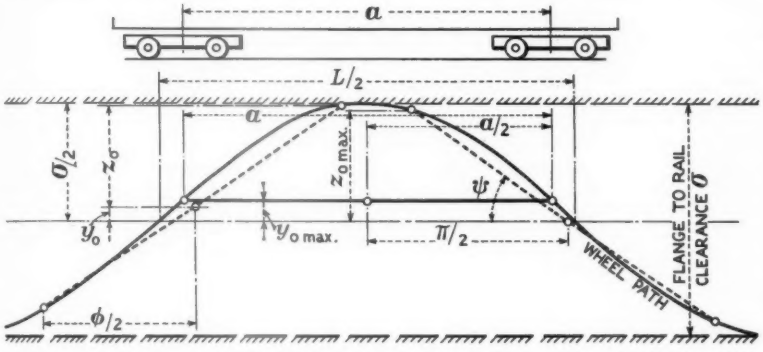


Fig. 11—The nosing motion as a combination of rotation and lateral displacement. The wavelength L (ft.) corresponds to one complete cycle (2π)

equivalent to the maximum lateral displacement to each side of the centre line of the track. Consequently:—

$$\psi=(\sigma/a)\sin(\pi/2)(2af/v)$$

The amplitude of excitation of body rotation is:—

$z_o=\pm\ \psi(a/2)=\pm\ (\sigma/2)\sin(\pi/2)(2af/v)$.

Generally both rotation about the vertical (Z) axis and displacement about the lateral (Y) axis are present simultaneously to induce nosing, and the amplitudes concerned are added to :—

$$x_t=z'_o+y'_o$$

where $z'_o=\pm(\sigma/2)\sin^2(\pi/2)(2af/v)$

and $y'_o=\pm(\sigma/2)\sin^2(\pi/2)[(2af/v)—\pi/2]$

To approximate the most unfavourable conditions, it will be permissible to neglect the phasing and determine z'_o only, while $y'_o=(\sigma/2)—z'_o$.

To determine the magnitude of lateral displacements, accelerations and ride index, it will be necessary to know the natural frequency of the lateral oscillations:—

$$f_l=(1/2\pi)\sqrt{c/m}\ \text{(cycles/sec.)}$$

as well as the natural frequency of the body hunting:—

$$f_h=(a/2\pi)\sqrt{c/I_z}$$

where c (lb./ft.) is the total lateral centring force imposed on the vehicle body by the swing links, etc., m (lb. sec.²/ft.) is the body mass, and I_z (lb. ft. sec.²) its inertia about the vertical axis, $I_z=mr^2$, where for diesel and electric locomotives

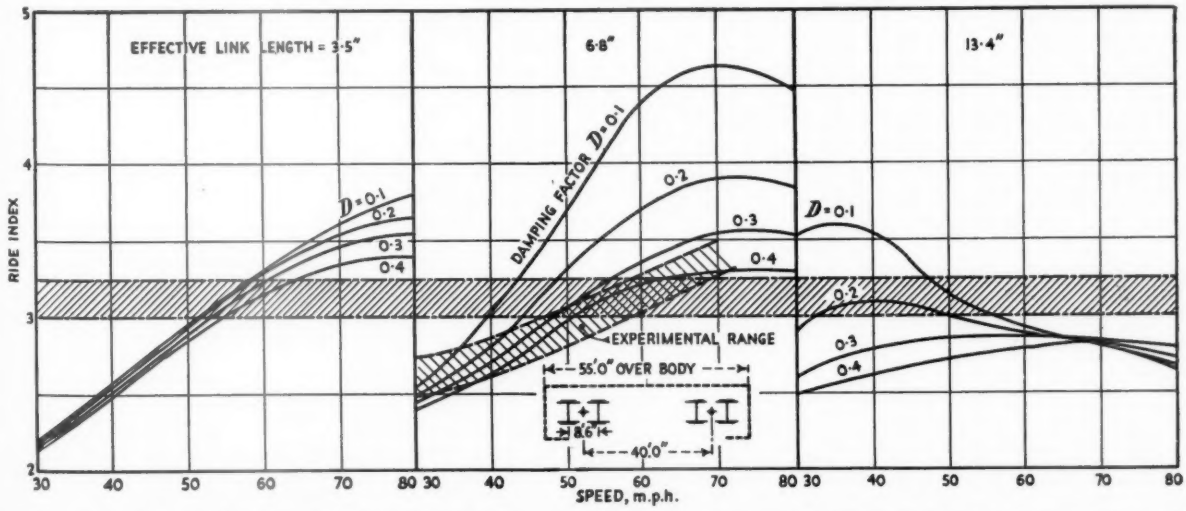


Fig. 12a—The effect of swing link length and damping factor on lateral ride index when running on "poor" track ($\sigma=\pm$ 0·25 in.). The bottom curve on left is plotted from tabulated data on page 540

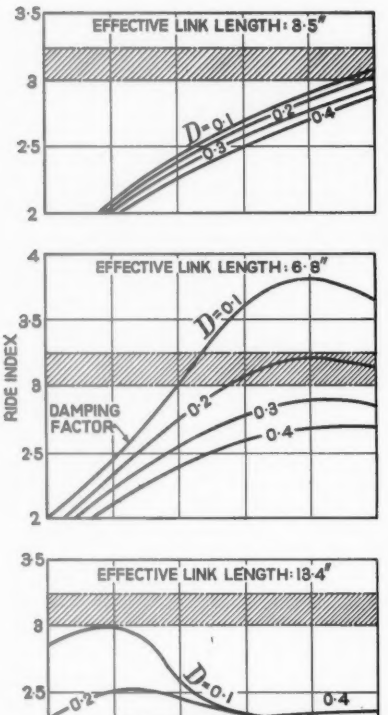


Fig. 12b—The effect of swing link length and damping factor on lateral ride index when running on "good" track ($\sigma = \pm 0{\cdot}125$ in.)

r=0·22 to 0·25L, while for coaches r=0·3 to 0·33L. Once the values of f_l and f_h as well as the excitation frequency f due to the wheels are known, the ratios f/f_l and f/f_h provide the values of the Amplitude Ratio R (Fig. 9) and this multiplied with x_t gives the magnitude of the body displacement d and the acceleration $b=d(2\pi f)^2$. The latter, together with f permits the determination of the ride index values from the graphs, Fig. 3b.

These considerations are, in the following, applied to a vehicle with the distance between bogie centres 2a=40 ft., the lateral clearance between flanges and rails being limited to $\sigma/2=\pm 0{\cdot}25$ in., while the natural frequency of the body nosing on the swing links was calculated as $f_h=1{\cdot}87$ c/s. as compared with $f_l=1{\cdot}67$ c/s for the purely lateral oscillations. The frequency of excitation due to the sinusoidal motion of the wheels was estimated along the lines shown in Fig. 4. The shaded band is the result of experimental determinations. The value of z'_o is obtained as:—

$$z'_o=\pm 0{\cdot}25\sin^2\left(\frac{\pi}{2}\times\frac{f}{v}\times 2\times 40\right)$$

$$=\pm 0{\cdot}25\sin^2\frac{\pi 40f}{1{\cdot}467V\ (\text{m.p.h.})}$$

$$=\pm 0{\cdot}25\sin^2 85{\cdot}5f/V$$

The resultant tabulated values are given above for a damping factor of 0·4 and a swing link length of 3·5 in.

The results are plotted in Fig. 12a together with ride index value obtained for longer swing links and a number of damping factors. The experimental values recorded with a vehicle of this type are entered as well, suggesting that reasonable correlation between simplified theory and practice is possible. These values relate to indifferent track, experience suggesting that the lateral accelerations of the vehicle body are practically halved on well-maintained track. The resultant index values are plotted in Fig. 12b. It is of particular interest to note that damping is of relatively little importance with short swing links, a fact substantiated by experience with some recent bogie designs with which carefully adjusted friction damping can be quite adequate to ensure good riding.

Good correlation between theory and practice is also suggested by the data plotted in Fig. 13 relating to a Co-Co locomotive.

Generally to ensure good riding in the lateral plane it will pay to keep, for a given body length L, the distance 2a between the bogie centres as large as possible and the body overhang at each end to less than 0·15L. The ratio of distance between bogie centres and I_z should be a maximum. To achieve this, heavy masses such as power plant should be at or near the vehicle centre so keeping I_z small.

The above considerations show the utility of this particular method of ride evaluation in readily providing data which permits comparison of vehicle performance in simple and unambiguous terms. In addition, it is possible to calculate the ride index values of vehicles in course of design, this facilitating a better appreciation of the influence of the design variables. Admittedly this simple method does not take in account all the possible combinations and permutations of extraneous influence encountered by vehicles in service. Simplifying assumptions can be made here at this stage, but even so the data obtained can be of considerable assistance to designers.

The ride index values, Fig. 3, are also of assistance when considering the performance of vibration dampers. For example, if at a frequency of 2 cycles per sec. the vertical index value should not exceed 3·2, then from Fig. 3a the acceleration should not exceed 0·065 g. or 25 in. per sec.², this value applying for the bolster springs of a vehicle with heavily damped primary springs. The amplitude of the oscillations should thus not exceed 0·155 in. per sec. which corresponds to a velocity of 10 ft. per min. The spring stiffness c (lb./ft.) permits the determination of the damping resistance p (lb. sec./ft.) and thus of the damper characteristic. The value of p is obtained from the relation

$$p=2D\sqrt{mc}$$

where D is the required damping factor.

Speed (m.p.h.)	30	40	50	60	70	80	
Freq. of excit.f (c/s.)	0·9	1·02	1·17	1·29	1·4	1·47	Fig. 4
Ampl. Ratio R	0·48	0·545	0·625	0·69	0·748	0.785	For $f_h=1{\cdot}87$
z'_o (in.)	0·134	0·204	0·228	0·241	0·243	0·25	
$z=R\times z'_o$(in.)	0·164	0·265	0·323	0·366	0·382	0·4	
Ampl. Ratio R	0·538	0·61	0·7	0·773	0·84	0·88	For $f_l=1{\cdot}67$
$y'_o=\sigma/2-z'_o$ (in.)	0·116	0·046	0·022	0·009	0·007	0	
$y'_n=R\times y'_o$ (in.)	0·15	0·065	0·033	0·014	0·011	0	
$y'_o+z'_o$ (in.)	0·314	0·33	0·356	0·38	0·393	0·4	
Acceler (g.)	0·026	0·035	0·05	0·065	0·079	0·084	$b=\frac{(y_o+z_o)(2\pi f)^2}{386}$
Ride Index	2·15	2·52	2·9	3·15	3·35	3·4	From Fig. 3b

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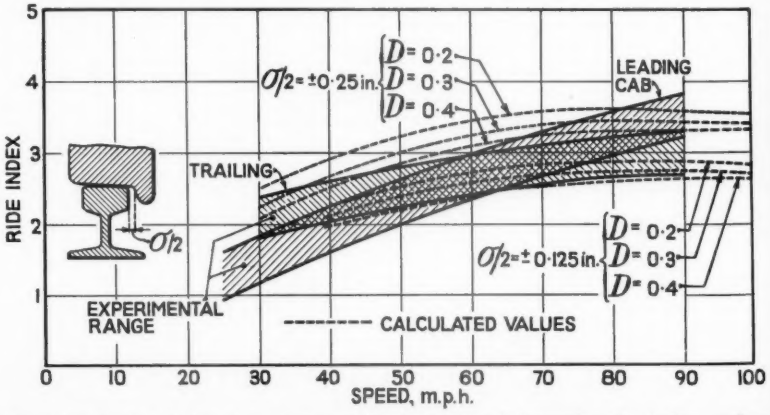
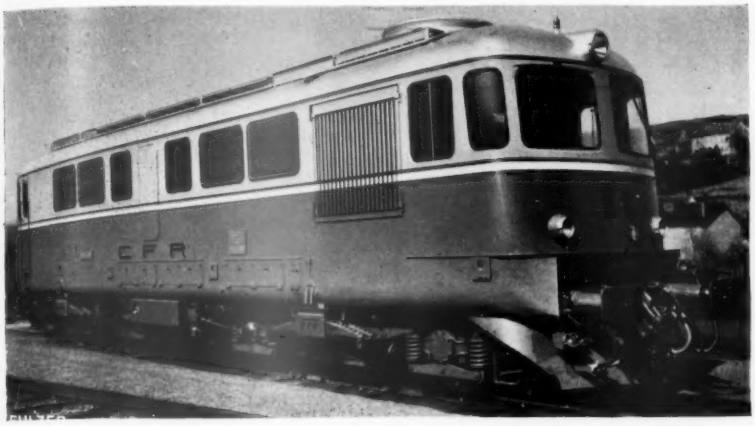


Fig. 13—Calculated and experimentally determined lateral ride index values for a Co-Co locomotive

Diesel-Electric Locomotives for Roumania

Co-Co 2,100-b.h.p. design by Swiss consortium for heavy goods service on 1-in-40 gradients



Roumanian State Railways 2,100-h.p. 112-ton Co-Co diesel-electric locomotive

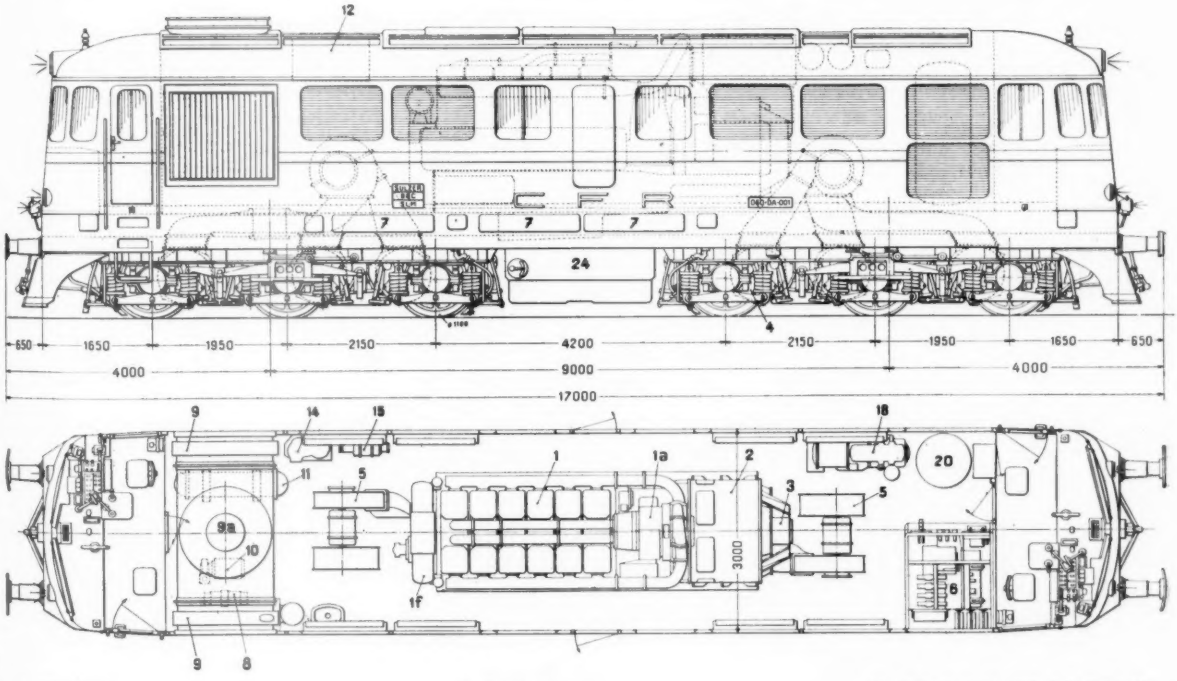
A SUBSTANTIAL addition to effective main-line motive power on the Roumanian State Railways is being made by the construction of 16 diesel-electric locomotives of Co-Co axle arrangement, 2,100 h.p. and 112 *tonnes* weight. Six of these locomotives have been built entirely in Switzerland by a consortium formed for the purpose of this contract, and consisting of Sulzer Bros. Ltd., of Winterthur, Brown Boveri & Co. Ltd., of Baden, and the Swiss Locomotive & Machine Works, of Winterthur. The first company supplied the engine and associated equipment, the second the electrical equipment, and the third the mechanical portion. This consortium was responsible also for the complete design, and the design is being used throughout for another 10 locomotives now under construction in Roumania, and for which the Swiss concerns are supplying the diesel-electric installation.

Intended principally for the Bucharest-Brasov main line, which has ruling gradients of 1 in 50 northbound and 1 in 40 southbound, these locomotives do not incorporate train-heating equipment. When they are used on passenger trains in winter a heating-boiler wagon is marshalled at the head of the train.

Multiple-Unit Control

Multiple-unit control is fitted, giving the possibility of 4,200 b.h.p. at the head of heavy trains which have to be worked to the normal schedule, but the capacity of a single unit to haul a trailing load of 600 *tonnes* up 1 in 40 at a steady 13½ m.p.h., and within the continuous rating of the transmission, should give wide utilisation without double-heading.

Built to a maximum axle-load of 19 *tonnes*, the whole weight is available for adhesion, and this value, 114 *tonnes* with two-thirds supplies on board, permits a starting tractive effort of 70,000 lb. to be exerted, and this is well up to the maximum which can be



1 Diesel engine
1a Pressure-charger
1f Lubricating-oil filter
2 Main generator
3 Auxiliary generator
5 Traction-motor blower group
6 Electric control cubicle
7 Starting battery
8 Voltage converter set
9 Water cooler
9a Cooler fan
10 Cooling-water pump
11 Oil cooler
12 Fuel and water tanks
14 Cooling-water and lubricating-oil heater
15 Auxiliary lubricating-oil pump and fuel-transfer pump
18 Braking air compressor
20 Main air reservoir
24 Main fuel tank

General arrangement of 2,100-b.h.p. Co-Co Class "060-DA" locomotive of the Roumanian State Railways (C.F.R.)

taken by the screw couplings. Continuous rated tractive effort at the wheel rims is 44,000 lb. at 13·4 m.p.h.; and top service speed is 62 m.p.h.

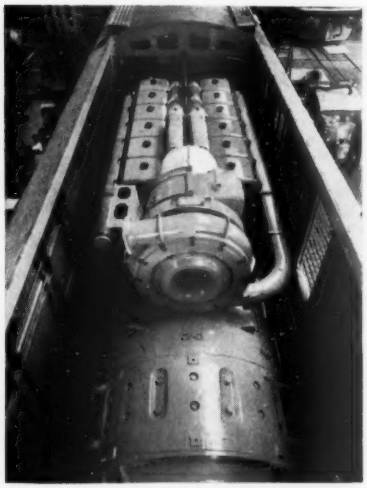
Leading particulars are as follow:—

Gauge	4 ft. 8½ in.
Wheel arrangement	Co-Co
Output	2,100 b.h.p.
Weight with two-thirds supplies	112 tons
Maximum axle load	18·7 tons
Top speed	62 m.p.h.
Starting tractive effort	70,000 lb.
Continuous rated tractive effort	44,000 lb. at 13·4 m.p.h.
Wheel dia.	43¼ in.
Bogie wheelbase	13 ft. 5 in.
Bogie pivot pitch	29 ft. 6 in.
Total wheelbase	40 ft. 8 in.
Length over buffers	55 ft. 9 in.
Fuel capacity	1,100 gal.

In the design of the mechanical portion can be traced the influence of the very successful 6,000 h.p. Gotthard Co-Co electric locomotives of the Swiss Federal Railways, for both the superstructure and the bogies are simplified versions of those embodied in those a.c. electric locomotives. The superstructure is of self-supporting type with a very strong underframe section welded up of I-section solebars into box form. The storage batteries are housed in this box section, and can be rolled out sideways on hinge-down doors for very easy servicing. The roof is in sections, enabling pistons and cylinder heads of the diesel engine to be removed, or the whole engine-generator group to be lifted out or lowered in. There is a full-width driving cabin at each end, with good heat and noise insulation from the central engine room. The driver is located in the right-hand corner of the cab.

Suspension

Locomotive body weight is supported in the bogies through lateral bearings to double inverted laminated springs arranged longitudinally on each side of the bogies. These springs are cross-connected with each other at the ends by swing bolsters. This suspension permits of lateral displacement of the body up to 1¼ in. each way. Supports between



Installation of Sulzer twin-bank engine and Brown Boveri main generator

the body and these laminated springs consist of V-shaped shoes running on slides in the form of part of a circle, the centre of which is in the middle of the bogie, thus an ideal pivot point is provided. The SKF roller-bearing axle-boxes have cylindrical guides of the type introduced by S.L.M. a decade or more ago for Swiss electric locomotives, and since adopted widely elsewhere. But in this case the twin helical springs for each axle-box do not encircle the guides, but are outside them, and are connected to the axle-box by a steel cradle attached to the base of the box. The axle-box suspension systems of the outer and centre axles of each bogie are equalised. Inside the helical springs are friction dampers, which have spring-load rubbing plates of Furkapress.

To keep the guiding forces of the bogie and the striking angles of the wheel flanges as small as possible when running through curves, such as the many of 900 ft. radius on the Campina-Brasov section, the two bogies are connected by a form of transverse coupling which serves only to ensure that the bogies take up favourable positions on curves; they do not transmit tractive effort or retardation forces between one bogie and another. This coupling includes a dash-pot. Flange lubrication is provided for the wheels on the two outer axles of each bogie.

Braking is complete and effective. A straight air brake with Oerlikon distributor operates clasp blocks on every wheel of the locomotive through two cylinders on each bogie, and each block has two renewable shoes. A Knorr automatic air-brake equipment is installed for actuation of the train brakes, and, like the Oerlikon straight air brake, has graduated application and graduated release. A change-over valve selects one of three possible braking stages corresponding to express passenger, passenger and freight train working. Further, there is automatic selection of maximum braking percentage on the locomotive in two stages, one for speeds above 37 m.p.h. and the other for speeds below that value. There is also a Brown Boveri-Charmilles anti-slip brake.

Two S.L.M. bogies with connecting linkage designed to improve guiding and reduce flange wear

Diesel Engines

Power is derived from one of the well-known Sulzer twin-bank pressure-charged 12LDA28 engines, with a U.I.C. rating of 2,300 b.h.p. but set in these installations to 2,100 b.h.p. at 750 r.p.m. Cylinders are 11 in. x 14¼ in. and dry weight 20·7 tons, including underbed. The two crankshafts are geared together to an output shaft by step-up gearing, by means of which the main generator speed is raised to 1,080 r.p.m. from the 750 r.p.m. of the engine.

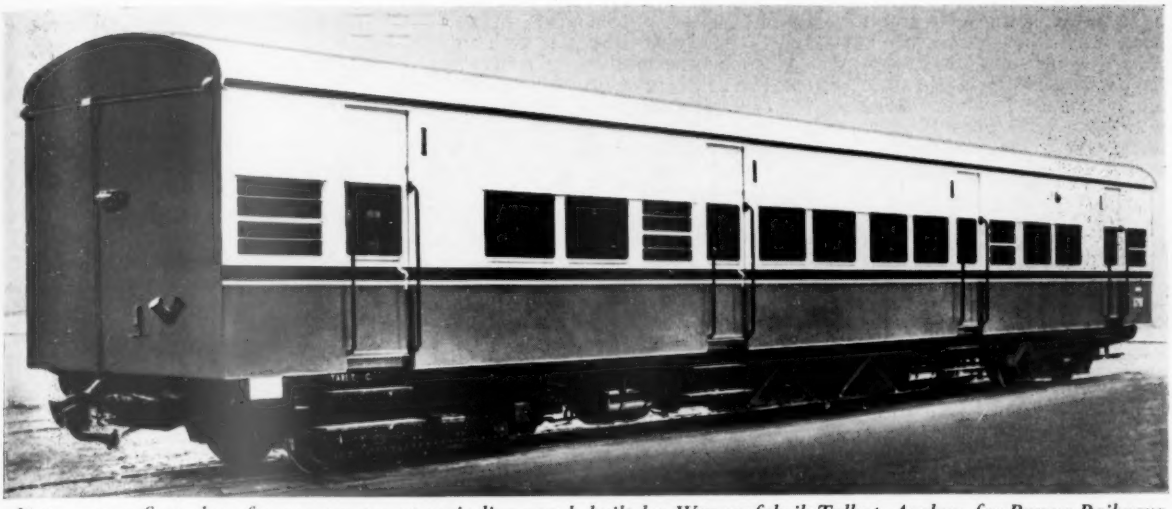
A Behr cooling unit with hydrostatic drive and control of the fan comprises two coolers, one on each side of the locomotive and with a single large fan in the roof. Engine lubricating oil is cooled in a heat exchanger connected into the cooling-water circuit. The water circulating pump is driven by a separate electric motor, and runs for a few minutes after the engine has been shut down. A Vapor heating unit is inserted in the water circuit, so that the system can be pre-heated, or freezing prevented during long periods standing with the engine shut down. This unit can also pre-heat the engine lubricating oil. Although the engine contains the usual engine-driven gear-type oil pump, there is a further electrically driven lubricating-oil pump feeding the governor, and passing a certain amount of bleed-off oil through small centrifuges. This pump can be started a short time before the main engine is started; combined with this pump is the fuel-transfer pump. Control of the diesel-electric power unit is by the Sulzer automatic regulation system, which also gives full protection against all forms of engine overloading.

Directly driven by the engine is a Brown Boveri 2,400 kVA. 10-pole main generator with an inset 75-kW. 175-V.

(*Continued on page* 544)

First Class Main-Line Coaches for Burma

Lightweight steel bodies of welded construction : lower berths formed by pulling forward transverse seats



Metre-gauge first class four-compartment main-line coach built by Waggonfabrik Talbot, Aachen, for Burma Railways

THE metre-gauge Burma Railways recently took delivery of first class coaches designed and built by Waggonfabrik Talbot, of Aachen. As regards accommodation, the vehicles are in accord with traditional practice for metre-gauge vehicles in India and Burma in being non-corridor, with longitudinal berths and side doors to each compartment. There are four compartments in each coach. Eight passengers can be accommodated in each compartment in seats by day, and four in berths by night.

As can be seen in the illustrations on the next page, the arrangement of seats and berths differs from the practice usual hitherto.

Principal dimensions are as follow:—

	ft.	in.
Length over buffers	60	6½
Length over body	58	0
Width over body	8	6
Bogie wheelbase	6	6
Height, rail to top of roof	11	0½
Length of underframe	56	6
Distance between bogie centres ...	41	0
Gauge	3	3½
Tare weight	26 tons 4 cwt	

Seats are trimmed with Epingle green woollen cloth. All seats have foam rubber fillings. Folding tables with plastic tops are fitted on the side walls under the windows between the two rows of seats. These can be folded down when not in use. In the space on the partition side, between the two groups of seats is a mirror with a parcel rack on the top.

The upper berths also are upholstered with foam rubber mattresses and Epingle. Eight hooks are fixed to the ceiling above each upper berth to take mosquito nets. Eight eyelets of looped cord fitted to the underside of each upper berth are provided to hold the mosquito nets for the lower berths. Access to the upper berths is by small steps fitted on the sides of the seats. Body side and door windows are provided with both glass and louvre shutters.

Underframe and Bogies

The underframe is of welded mild steel construction. The solebars being of Z-section and longitudinals of channel section, run the full length of the underframe. They are welded to the headstocks formed of three $\frac{3}{4}$ in. thick plates butt-welded together to constitute one single piece.

The crossbars are from three pieces $\frac{3}{8}$ in. thick pressed steel plates welded in between the solebars and longitudinals. The underframe has a camber of $\frac{1}{2}$ in. under tare load and is so designed that a positive camber is maintained even when the coach is under full load. On actual test it was found that the coach was capable of carrying a vertical load of 30 tons with a positive camber. Because of the welded construction, the underframe has been normalised to relieve it of any internal stresses developed during welding. The underframe is designed to withstand a buffing load of 150 tons.

Bogies are of riveted mild steel construction comprising rolled steel sections and plates. The wheels are solid forged disc wheels of 2 ft. 4½ in. dia. on tread and the wheelbase is 6 ft. 6 in. Brakes are automatic vacuum.

The bogie bolster is a box-type girder and rests on elliptical springs. The bearing springs are helical, caged inside the solebars.

Body Construction

The body frames are of lightweight steel and of welded construction. The exterior panels of $\frac{3}{32}$ in. planished steel sheets are tack or continuously welded to the framing.

The roof structure consists of two cant rails of Z-section and two purlins of angle section. The carlines, which are of angle section are welded to the cant rails and purlins. The roof sheets are $\frac{3}{32}$ in. thick. They are placed longitudinally and seam-welded and then finally welded to the roof structure. The roof is capable of supporting in any position on the central part, a concentrated load of about 900 lb. Ventilation is by Airvac roof ventilators.

As an anti-corrosive measure, the body shell after being thoroughly sand-blasted, has been sprayed with zinc on the four walls inside and the roof inside and outside. Two coats of zinc, each .002 in. thick have been applied followed by a coat of zinc-chromate and thereafter painted with red oxide.

Holes have been drilled in the rails and pillars afford continuous air circulation between the interior and exterior panelling and to the roof, to avoid condensation on the wall surface and subsequent corrosion.

Interior Finish

The interior panelling is finished in walnut pattern $\frac{1}{8}$ in. thick plastic heat- and water-proof sheet. Flooring in all compartments, bathrooms and lavatories is of 1 in. seasoned teak covered with green linoleum cloth in the compartments and with brown plastic material, Mipolam, in bathrooms and lavatories.

The bathrooms and lavatories have walls covered with porcelain tiles up to waist high. Beading where necessary is of a light alloy, Eloxiert. The ceiling inside the compartment is covered with $\frac{5}{64}$ in. thick white Traffolite and that in the lavatory and bathroom with the same material $\frac{3}{16}$ in. thick.

Lavatories and bathrooms are attached to each compartment. The lavatories

are equipped with European type porcelain flushing commodes fitted with plastic covers and zinc chutes, toilet paper holders, and coathooks.

Each bathroom is fitted with washbasin, shower, mirror, towel rails, coathooks, and wardrobes. The windows fitted in the lavatories and bathrooms are of the obscured pattern with the glasses frosted and protected by bar frames. The fittings for the ceiling lights are single 10-W. b.c. lamp-holders.

A total of 400 gal. of water is carried in galvanised mild steel tanks of welded and riveted construction situated in the roof over the lavatories and bathrooms.

The body side doors, of pressed steel, are hinged to the pillars and open inwards. They are fitted with guards locks and with double acting spring loaded automatic locks at the height of waist rail.

Lighting

The electric lighting in each compartment comprises two roof lights and four 15W. reading lamps of lift cover switch type. There are two 16-in. sweep ceiling fans of universal type controlled by a flush type regulator located in a convenient position in the compartment.

Power for the electrical equipment is provided by Stone 50 amp. I.R. type 29S. axle-driven dynamos. The battery is of Exide Ironclad lead acid type of 200 amp. hr. capacity suitable for 24V. and arranged in two sets of 12 batteries in each. Inter-vehicle connections are with 5-core cable Kent couplers. The wiring is on the Stone 24-V. double-battery parallel block system.

The lights in the compartments are controlled individually by two two-way switches; one fitted on the body side pillar between the seats and the other near the door.

Eight seats in compartment by day

Four berths arranged for night travel

Diesel-Electric Locomotives of Roumania

(*Concluded from page* 542)

auxiliary generator. The weight of the group is 16,600 lb., and the group is mounted on an extension of the engine underbed, which is itself an integral part of the crankcase structure. Continuous-rated current of the main machine is 2,460 A., and maximum voltage is 890.

From the main generator three parallel circuits are taken to three pairs of series-connected nose-suspended traction motors, each through a selection switch, a maximum-current relay, and a reversing switch. To keep the rated output of the main generator as small as possible, while at the same time ultilising as fully as possible the main engine output almost up to the maximum track speed, the field circuits of the traction motors can be weakened in two stages.

Each traction motor has a continuous rating of 200 kW. at 820 A. The reduction gearing has a ratio of 15: 69, and the wheel is of resilient form. Force ventilation is supplied from two motor-blower sets, each set feeding the three motors on one bogie with up to 3,530 cu. ft. of air per min. per motor. A self ventilating fan is also attached to the rotor of each traction motor, so that proper cooling flow can be maintained if the locomotive is travelling with engine shut down. The motor nose is supported on the bogie transom through two groups of helical springs.

Full advantage has been taken of the space available within the locomotive body to give full access to the electrical control gear, all of which, except those items which must be attached to extraneous equipment, is housed in a single large cubicle arranged corner-wise against the bulkhead of one of the driving cabs. It has two large glass inspection windows on the two sides within the engine room, and large access doors on those two sides and in the two other sides, one of which is in the driving cabin and the fourth in one of the outside walls of the locomotive superstructure. All the equipment in this cubicle is erected as one assembly, and the whole lowered into the locomotive, with the very minimum number of connections which then remain to be made.

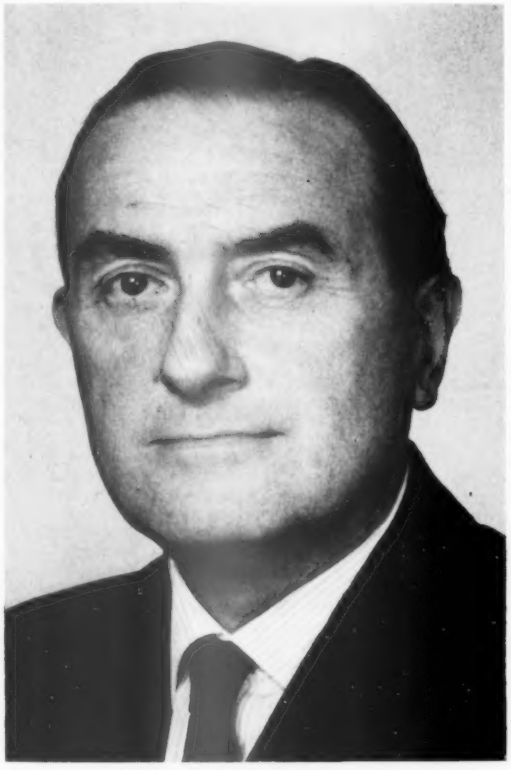
On measured tests in Switzerland and Roumania these locomotives have shown themselves capable of hauling goods trains of 1,000 *tonnes* along the level at 37/40 m.p.h., and of starting a 936 *tonne* train on a 1 in 83 gradient and accelerating it to a steady 16½ m.p.h. Also, goods trains of 550 *tonnes* trailing have been started on 1-in-40 gradients and accelerated up to a balancing speed of 14 m.p.h. on that gradient.

RAILWAY NEWS SECTION

PERSONAL

Mr. Maurice Holmes is to become Chairman of the Tilling Group Management Board on the retirement from the board of Mr. Stanley Kennedy on March 31. Mr. Holmes is an Executive Director of the Board.

Mr. Pearson Armstrong, Assistant Regional Establishment & Staff Officer, Paddington, Western Region, British Railways, who, as recorded in our November 13 issue, has been appointed Regional Establishment & Staff Officer, Liverpool Street, Eastern Region, entered railway service in 1921, in the Secretary's Office, North British Railway, Edinburgh. In 1923, he was transferred to the personal staff of the Divisional General Manager, Scottish Area, London & North Eastern Railway, Edinburgh, and, in 1938, was appointed to the joint staff office of the District Operating Superintendent, District Goods & Passenger Manager and District Locomotive Running Superintendent, Edinburgh, as Wages Staff Questions Clerk. He returned to the Divisional General Manager's Office, Edinburgh, in 1940, on salaried and wages staff matters. He moved to the North Eastern Area, L.N.E.R., in 1941, on appointment to the headquarters joint staff office of the Operating Passenger Commercial, Goods Commercial and Locomotive Running Departments at York, where he became Head of the Docks & Locomotive Sheds & Shops Staff Section. He returned to the Scottish Area, in 1943, as Head of the Locomotive Staff Section in the joint staff office of the Operating Superintendent, Passenger Manager and Locomotive Running Superintendent. In 1945, he was appointed Deputy Staff Assistant, and, in 1946, became Staff Assistant to the Operating Superintendent, Passenger Manager and Locomotive Running Superintendent, Scottish Area, L.N.E.R. On nationalisation, Mr. Armstrong transferred to the headquarters of the Scottish Region, Glasgow, as Staff Assistant to the Operating Superintendent and the Motive Power Superintendent, where he was closely associated with the staff re-organisations arising from the fusion of the former L.N.E.R. and L.M.S.R. staffing arrangements in Scotland. In 1951, he was appointed Assistant (Wages Staff), Regional Staff Office, Western Region, Paddington and in 1957 Assistant Regional Establishment & Staff Officer, Western Region, the position he now vacates.



Mr. Pearson Armstrong
Appointed Regional Establishment & Staff Officer, Eastern Region

Mr. G. J. Hastie
Appointed General Manager of the Tasmanian Government Railways

The following Divisional Executive appointments have been made in the Traction Division, Associated Electrical Industries Limited: General Manager, Mr. F. Whyman; Commercial Manager, Mr. W. B. G. Collis; Manufacturing Manager, Mr. R. P. Knight; Chief Engineer, Mr. G. R. Higgs; Divisional Executive (Rugby), Mr. J. H. Cansdale.

Mr. John G. Bridges, Director-General, British Travel & Holidays Association since 1945, has been elected President of the International Union of Official Travel Organisations. He is Chairman of the Technical Commission on Travel Development, I.U.O.T.O., a member of the Executive Committee and Chairman of the Study Group on International Travel Statistics.

Mr. J. K. Blue, Passenger Commercial Assistant, Line Traffic Manager's Office, South Eastern Division, Southern Region, British Railways, has been appointed Passenger Assistant, Waterloo. He succeeds Mr. J. D. Atkins who retires on December 31.

Mr. G. J. Hastie, A.M.I.E. (Aust.), M.I.Loco.E., Chief Mechanical Engineer Tasmanian Government Railways, who, as recently recorded, has been appointed General Manager of the Railways & Associate Commissioner of the Transport Commission of Tasmania, began his railway career with the Queensland Railways, in 1919, as an apprentice fitter and later qualified as Assistant Engineer. In 1939 he was seconded to the Ministry of Munitions for training in the manufacture of air-frames in England. During 1940, Mr. Hastie was engaged in planning work, in Melbourne, for the manufacture of Beaufort bombers. From 1940 to 1943 he directed the manufacture of large gun lathes and ships' fittings in the Ipswich workshops. In 1943 he returned to the Queensland Government Railway Service to deal with the transport of troops and materials. Mr. Hastie joined the Tasmanian Government Railways, as Manager of the principal railway workshops at Launceston, in November, 1945, and was appointed Chief Mechanical Engineer in 1948. He holds a Diploma of Mechanical and Electrical Engineering and a Diploma of Industrial Chemistry.

Mr. F. L. Lambert
Appointed Chief Electrical Project Officer, L.M. Region

Mr. C. F. Rose
Appointed Mechanical & Electrical Engineer (Development), Eastern Region

Photo:] [*Elliot & Fry*
The late Mr. T. H. Seaton
Assistant Engineer (Maintenance), L.N.E.R., 1946–47

Mr. F. L. Lambert, B.Sc., M.I.C.E., Assistant Civil Engineer, London Midland Region, British Railways, who, as recorded in our October 30 issue, has been appointed Chief Electrical Project Officer, studied civil engineering at University College, London, where he graduated with first class honours and was awarded the Vernon Harcourt prize for Civil Municipal Engineering. Beginning railway service, in 1929, with the Great Western Railway, Mr. Lambert served under the Divisional Docks Engineer at Newport & Cardiff, and the Divisional Engineers at Wolverhampton, Taunton and Gloucester. In 1946 he was appointed Assistant Divisional Engineer, Cardiff, and two years later transferred to Neath, and subsequently to Cardiff in similar capacities. He was appointed Acting Divisional Engineer, Abergavenny in 1949, District Engineer, Shrewsbury in 1951, and District Engineer, Newport in 1952. Mr. Lambert became Assistant Engineer (Works Maintenance), Paddington in 1955, and in February this year he was appointed Assistant Civil Engineer at Euston, London Midland Region.

Mr. C. F. Rose, B. Sc. (Eng.), A.M.I.Mech.E., M.I.Prod.E., M.I.Loco.E., Production & Works Assistant to the Chief Mechanical & Electrical Engineer and the Carriage & Wagon Engineer, Eastern and North Eastern Regions, Doncaster, who, as recorded in our November 13 issue, has been appointed Mechanical & Electrical Engineer (Development) in the Department of the Chief Mechanical & Electrical Engineer, Eastern Region, will be located at the Headquarters Office of the Department in London. Mr. Rose was educated at the Grammar School, Streatham, and entered the Stratford Works, L.N.E.R., as a premium apprentice in 1926. During his apprenticeship he was awarded a Directors' Scholarship and was thus enabled to continue his education at Queen Mary College, University of London. Following a period in the drawing office at Stratford, he was appointed Mechanical Chargeman, Brentwood, under the District Locomotive Running Superintendent, Stratford. In 1937 he became Technical Assistant at Shildon Wagon Works, and was closely associated with the major developments at this works. Later, as Assistant to the Works Manager, he was largely responsible for the production control of the war works. In 1944 he was appointed Assistant Works Manager, Shildon. Mr. Rose was appointed Assistant Works Manager, Doncaster, in 1946, and from 1952 to 1954 acted as Locomotive Works Manager, during the absence in India of the Works Manager. He then undertook special investigations in the Chief Mechanical & Electrical Engineer's and Carriage & Wagon Engineer's Departments, as the Deputy-Chairman of a full-time all-regional committee set up by the General Managers. In 1956 he was appointed Production & Works Assistant to the Chief Mechanical & Electrical Engineer and the Carriage & Wagon Engineer,

Mr. T. G. Hughes
Appointed European Traffic Manager, C.P.R.

Mr. R. H. Hobern
Appointed Regional Sales Manager (Rail & Ocean), C.P.R.

Mr. R. Carlisle
Appointed Public Relations & Commercial Officer, Ulster Transport Authority

Eastern and North Eastern Regions. Mr. Rose attended the Administrative Staff College, Henley-on-Thames, in 1953, and has been closely associated with the work of the local committees of the Institutions of Production and Locomotive Engineers.

Mr. T. H. Seaton, M.I.C.E., F.S.I., Assistant Engineer (Maintenance), London & North Eastern Railway, 1946-47, whose death on November 22 was briefly recorded in our December 4 issue, served for a short time at the beginning of his career with the Lancashire & Yorkshire Railway. He subsequently joined the Great Central Railway, where he was engaged on maintenance, new works, and bridge reconstruction. Later, he moved to the Great Eastern Railway, and during the 1914-18 war his services were loaned to the War Office, for railway design and construction for the Directorate of Movements & Railways. At the end of the war, after a period as Acting District Engineer at Stratford, he went to the Engineer's Office at Liverpool Street for supervision of harbour engineering. In 1924, Mr. Seaton took charge temporarily of the Cambridge District, L.N.E.R., and in the same year was appointed District Engineer, Leeds. He was transferred to Stratford in a similar capacity in 1928. He was at one time responsible for pioneer work in connection with the application of welding to the maintenance of railway structures and permanent way. He was, in particular, closely associated with the introduction on the L.N.E.R. of the oxy-acetylene welding of crossings. He also carried out much research work in connection with the stability of soils. In 1937 he became Assistant to Engineer (New Works), London. In 1946, under the re-organisation of the Engineer's Office, he became Assistant Engineer (Maintenance), London, the position from which he retired in July, 1947. Mr. Seaton was the author of papers on a variety of engineering subjects to technical societies. He was a member of the Research Sub-Committee on Earth Pressures of the Institution of Civil Engineers.

Mr. T. G. Hughes, Chief Assistant to the European Traffic Manager, Canadian Pacific Railway, who, as recorded in our November 6 issue, has been appointed European Traffic Manager, joined the C.P.R. in 1938 as a junior clerk in the Passenger Department. He served in the Army throughout the 1939–45 war, and was with the Airborne Division in North Africa, Italy and Greece. He returned to the company in London after the war, rejoining the Passenger Department, first on the rail and ocean side and later on air traffic work. In 1952 he was appointed Personal Assistant, and in 1956 Chief Assistant to the European General Manager. The position to which Mr. Hughes is now appointed is a newly created one. He will be responsible for all passenger traffic matters in Europe.

Mr. R. H. Hobern, Assistant General Passenger Agent, London, Canadian Pacific Railway, who, as recorded in our November 6 issue, has been appointed Regional Sales Manager (Rail & Ocean), joined the C.P.R. in London in 1920, in the Passenger Department. When the company's office was opened in Southampton, in 1922, he was transferred there. Between 1930 and 1939, Mr. Hobern travelled during the winter season as Cruise Director aboard the company's liners to the West Indies and the Mediterranean. When the Southampton office was bombed during the 1939–45 war Mr. Hobern was transferred to the Bristol office, where he later became Passenger Agent. In 1950 he returned to London as Assistant Manager of the booking office. He was appointed General Passenger Agent, Liverpool, in 1952. Mr. Hobern became Assistant General Passenger Agent, London, in 1955.

Mr. Robert Carlisle, M.Inst.T., who, as recorded in our November 6 issue, has been appointed Public Relations & Commercial Officer, Ulster Transport Authority, began his career in public transport in 1927, with the former Belfast Omnibus Co. Ltd. He joined the Northern Ireland Road Transport Board on its formation, in 1935, and was closely associated with its progress. On the establishment of the Ulster Transport Authority, in 1948, he was occupied on the financial side during the early years, afterwards transferring to the traffic side.

Mr. G. Wright, Assistant to the District Goods Superintendent (Sales), Leeds, North Eastern Region, British Railways, has been appointed Goods Agent, Halifax.

Sir Gilmour Jenkins has joined the Board of the East Kent Road Car Co. Ltd. He was Permanent Secretary of the Ministry of Transport until he retired earlier this year.

Mr. W. M. Dravers has been appointed Chairman, Devon General Omnibus & Touring Co. Ltd. in succession to Mr. W. T. James, who has resigned from the board. As a result, Mr. Dravers has resigned his office as Managing Director of the company. Lord Buckhurst has been appointed a director.

Mr. A. S. Parmenter and Mr. C. Riley have been appointed Directors of the British Automatic Co. Ltd.

We regret to record the death on December 1, at the age of 49, of Mr. J. H. Kirkby, Managing Director, Manchester Dry Docks Co. Ltd.

Admiral Sir Michael M. Denny has been appointed a Director of English Steel Corporation Limited. He is the newly appointed Chairman of Cammell Laird & Co. Ltd. Mr. W. D. Pugh has been appointed Chairman of English Steel Forge & Engineering Corporation Limited, of English Steel Rolling Mills Corporation Limited, of English Steel Castings Corporation Limited, of English Steel Spring Corporation Limited and of Taylor Bros. & Co. Ltd. Mr. W. E. A. Redfearn has been appointed Managing Director of English Steel Forge & Engineering Corporation Limited, and Mr. R. G. H. Taylor and Mr. G. Craven have been appointed Chairman and Managing Director respectively of English Steel Export Corporation Limited.

The Institute of Metals

The following members have been elected to fill vacancies on the Council of the Institute of Metals with effect from March 29, 1960 :—

President :

Sir Ronald Prain, Chairman & President, Rhodesian Selection Trust Limited.

Vice-Presidents :

Mr. H. M. Finniston, Research Manager, C. A. Parsons & Sons Ltd.

Mr. H. W. Hignett, Assistant Managing Director, Henry Wiggin & Co. Ltd.

Ordinary Members of Council :

Mr. R. W. K. Honeycombe, Professor of Physical Metallurgy, Sheffield University.

Mr. Ivor Jenkins, Chief Metallurgist, Research Laboratories, General Electric Co. Ltd.

Mr. E. Robson, Managing Director, Manganese Bronze & Brass Co. Ltd.

Mr. J. Salter, Director, British Aluminium Co. Ltd.

Mr. Christopher Smith, Works Director, James Booth & Co. Ltd.

Mr. S. W. Smith, Traffic Assistant to the Divisional Traffic Manager, London, London Midland Region, British Railways, has been appointed Assistant Divisional Traffic Manager, Manchester, and not Divisional Traffic Manager, Manchester, as recorded last week.

Arising from a reorganisation of the Railway Department, FAG Bearing Co. Ltd., the services of Mr. A. Bates, formerly Railway Engineer, have been relinquished. Mr. L. Grove assumes responsibility to the board for all railway bearing applications. He will be assisted by Mr. C. Austin.

Mr. C. P. Paton has resigned from the board of the Northern Aluminium Co. Ltd., to take up a position with Aluminium Limited of Canada in Montreal. Mr. Taylor Cornelius, who has taken over from Mr. Paton as General Works Manager of Northern Aluminium Co. Ltd., has been elected a Director of that company. Mr. Cornelius was until recently, Vice-President of Aluminium Limited of Canada.

Mr. K. Neve is to succeed Mr. R. M. Bateman as Chairman of Turners Asbestos Cement Co. Ltd. Mr. Bateman will relinquish the Chairmanship and cease to be a Director of Turners Asbestos Cement Co. Ltd., on January 1, in order to devote his time wholly to his functions as Deputy-Chairman of the parent company, Turner & Newall Limited. Mr. Neve is Executive Director of Turners Asbestos Cement Co. Ltd., and a Director of Turner & Newall Limited.

The Institution of Locomotive Engineers

The following names have been entered on, or transferred in, the register of the Institution of Locomotive Engineers:—

Member

Mr. W. Thompson, Assistant to C.M. & E.E. (Electrical), Swindon, Western Region, British Railways.

Associate Members

Mr. E. Bennett, Design Engineer, Traction Development Department, English Electric Co. Ltd.

Mr. S. N. Dutta, Works Manager, Lillooah, Eastern Railway, India.

Mr. F. P. Rendell, Executive Assistant, Senior Material Inspector, Acton Works, London Transport Executive.

Graduate

Mr. W. P. Tholen, Design Engineer (Traction Control Gear), British Thomson-Houston Co. Ltd.

Students

Mr. W. J. Brophy, Engineering Apprentice, Locomotive Works, Eastleigh, Southern Region, British Railways.

Mr. G. A. Glover, Student Apprentice, Hunslet Engine Co., Ltd.

Mr. M. W. Knight, Engineering Apprentice, Locomotive Works, Eastleigh, Southern Region, British Railways.

Mr. D. G. Robinson, Acting Draughtsman, Stratford, Eastern Region, British Railways.

Transfer Associate Member to Member

Mr. J. A. R. Closel, General Manager, Mauritius Government Railways.

Transfer Graduates to Associate Members

Mr. E. Cowley, Assistant Mechanical Engineer (Works), Nairobi, East African Railways & Harbours.

Mr. J. I. C. Flint, Assistant District Motive Power Superintendent, Kentish Town, London Midland Region, British Railways.

Mr. T. R. Tinning, Technical Inspector, Motive Power Superintendent's Office, Buchanan Street, Glasgow, Scottish Region, British Railways.

XUM

NEW EQUIPMENT AND PROCESSES

Spraying Equipment

THE truck-mounted Hydra-Spray operates by high hydrostatic pressures varying from 1,000 to 3,000 lb. per sq. in. These pressures are achieved by a reciprocating, double-acting air motor coupled by a connecting rod to a reciprocating double-acting pump. This multiplies fluid pressure to 20 times the air pressure admitted to the air motor, e.g., with an incoming air-line pressure of 80 lb. per sq. in., the pump develops 1,600 lb. per sq. in. fluid pressure.

This high pressure is confined to the pump, to the 20-ft. length of Teflon tube, and to the spray gun. The Teflon tube is reinforced with an external stainless steel wire braid and has a burst pressure of 10,000 lb. per sq. in. A tungsten carbide nozzle on the spray gun resists the erosion of abrasive paint when under high pressure. At no time is there any pressure in the paint container (removed in photograph to show pump and paint agitator).

Because the unit does not use compressed air to atomise the paint, virtually all overspray is eliminated; so effective is this reduction in over-spray that a saving of approximately 3 gal. paint out of every 10 gal. used is claimed.

The accompanying illustration shows the 226-062 truck-mounted unit, which is supplied with a 10-U.S.-gal. pail, rubber-tyre truck, 15-ft. ½-in. i.d. air supply hose, 20-ft. ¼-in. i.d. "Teflon" stainless steel braided high-pressure fluid hose and Hydra-Spray hand gun at a cost of £495 net.

Maximum permissible length of fluid hose to each gun is 80 ft. This length is obtained by coupling four standard 20-ft. lengths, and although, as standard, one spray gun is supplied with each unit, two guns can be used simultaneously with unimpaired performance. A dual outlet manifold is fitted to each unit for this purpose at no extra cost.

Further details can be obtained from the sole U.K. distributors, Alfred Bullows & Sons Ltd., Long Street, Walsall, Staffs.

Heat and Vapour Seal

HEAT-LOK is a new treatment providing a protective chemical blanket for hot immersion processing baths. Its use is claimed to effect economies in heating costs, improved working conditions, and a reduction in equipment maintenance.

The treatment incorporates a sealant to form the blanket on the surface of the bath, and an additive which is a surface activating agent in the processing solution. It does not harm the coating characteristics of the processing solution; indeed, it tends to produce more complete and uniform coatings.

The additive is replenished in direct proportions to the amount of replenishing chemical used for maintaining the specified concentration of the processing solution. The sealant is added to maintain an approximately ½-in. thick chemical blanket on the surface of the solution.

The sealant is available in non-returnable 5-gal. and 1-gal. cans and the additive in non-returnable 10-lb. tins. Both materials are supplied ex-stock. Further details can be obtained from The Pyrene Co. Ltd., Metal Finishing Division, Great West Road, Brentford, Middlesex.

Direct-Reading Vibration Meter

A NEW direct-reading vibration meter, the PR.9252, features a wide measuring range and direct-indication in vibration amplitude. It has a transistorised amplifier and is fed from a built-in chargeable miniature battery. There is an additional input for a phase-indicator and an output jack for oscilloscope or recorder.

The instrument is supplied complete with battery and mains cable in a wooden carrying case. This has space for the storage of accessories, such as an absolute vibration pickup Type PR.9260, which are not included in standard delivery.

Special features are light weight and convenient dimensions. The apparatus measures 220 mm. x 130 mm. x 100 mm. and weighs 2·5 kg. Including the carrying case, total dimensions and weight are 250 mm. x 240 mm. x 250 mm. and 4·3 kg. (inclusive of apparatus and mains cable, but exclusive of accessories).

Further details can be obtained from Research & Control Instruments Limited, Instrument House, 207, Kings Cross Road, London, W.C.1.

Long-throw Drum Louvres

A DRUM-TYPE punkah louvre, designed for use with air conditioning, heating, and ventilating installations in large enclosed areas, is claimed to offer a number of advantages—particularly for land work. It is constructed from aluminium alloy sections.

In large enclosed areas such as concourses and passenger terminals, the drum louvre obviates the necessity for long, expensive runs of ductwork. It has a throw of up to 120 ft. and provides complete control of air distribution in both vertical and horizontal planes. The air outlet is contained in a drum which can be rotated through 60 deg. about a long axis. Deflecting vanes in the opening are adjustable to give directional control at right angles to this axis, and permit the length of throw and residual velocity of air to be varied.

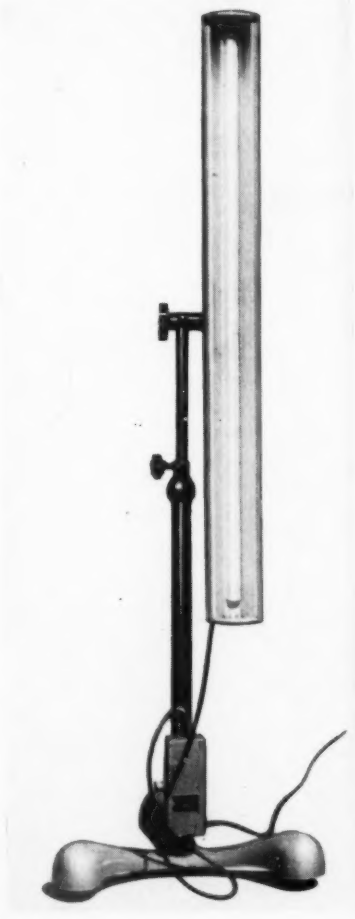
The louvres are available in eight sizes, from approximately 1 ft. to 3 ft. in length, with depths of 9 in. or 12 in. They can be mounted horizontally or vertically. Duct openings vary from approximately 10 in. x 6 in. to 36 in. x 10 in. The largest of the louvres weighs 11 lb. The louvres have satin anodised finish.

Further details can be obtained from the manufacturer, Thermotank Limited, Helen Street, Glasgow.

Mobile Fluorescent Local Lighting

THE latest addition to the Allen range of portable fluorescent work and inspection lights is the Type A.130, which uses a 4 ft., 40-W. tube.

Fully adjustable and mobile, the A.130 is designed to provide cool, glare- and shadow-free light for maintenance and



construction workers. Its tube is housed in a metal reflector with a clear Perspex front cover. The reflector can be moved in any direction and locked as required, the telescopic column allowing for adjustment in height.

The heavy, three-leg base has large diameter rubber-tyre castors and is perfectly stable regardless of lamp position. Necessary control gear and switching is contained in a metal case at the base of the centre column.

Price is £22 nett trade, including fluorescent tube. Further information can be obtained from the manufacturer, P. W. Allen & Co., 253, Liverpool Road, London, N.1.

Loader

THE Muir-Hill 2WL loader combines a 50-deg. roll-back bucket action with a pry-out force of 7,100 lb., more than double the previous rating, and can obtain a heaped load from a stockpile at a single "bite," thus obviating the need for repeated ramming. The result is faster operation, bigger loads, and less wear and tear on machine and tyres.

Advantages include a powerful Fordson Power Major 3.6-litre 4-cylinder diesel engine developing a maximum of 56 b.h.p. at 1,800 r.p.m. and maximum torque of 171 lb. per ft. at 1,200 r.p.m.

Power is transmitted through a Borg & Beck 13-in. single dry-plate clutch to a constant-mesh gearbox providing six forward speeds of 2, 2.8, 3.5, 5, 7, and 12.6 m.p.h., and two reverse speeds of 2.6 and 4.8 m.p.h. Final drive is through a double-reduction driving axle with a four-pinion differential and spur bull pinions and gears. Hydraulic transmission, incorporating a torque converter, is an optional extra.

General and special-purpose buckets of from ¾ to 2 cu. yd. capacity are available for use in conjunction with the loader. Of improved shape, these are fitted with abrasion-resistant blades and check plates.

Height of lift under the lip of the tipped bucket is 9 ft. 8 in. with 1 ft. 8 in. clearance under the bucket hinge. Outreach at this point is 3 ft. 6 in. from the front of the machine, and maximum outreach, 6 ft. 2 in. Maximum lift height of the beams is controlled to prevent strain on the hydraulic system.

Operation is smooth and positive, speed being controlled by selector as required. Hydraulic power is provided by a heavy-duty gearpump connected to the engine crankshaft by Hardy Spicer flexible couplings, high-pressure fluid passing through a double selector controlled by twin levers.

Powerful double-acting rams of 4 in. piston dia. are fitted to beams and bucket control linkages. The main beam rams provide an increased tearaway force of 6,500 lb. at the bucket lip while bucket control rams give a pry-out force on roll-back of 7,100 lb.

To facilitate rapid repairs in the field, hoses with re-usable end fittings have been introduced.

Further details can be obtained from E. Boydell & Co. Ltd., Old Trafford, Manchester.

Wire Rope Terminal

THE advantages claimed for the Tullcon wire rope terminal, which after certain modifications, has been approved by Lloyds, are that it can be fitted on site by unskilled labour without any heating or degreasing and it cannot be pulled off.

The complete terminal, which is normally made in E.N.8 metal, consists of a sleeve, a grooved and tapered pin and a terminal-head.

To fit the terminal, the end of the wire, from which a short length of core has been removed, is passed through the sleeve and the tapered pin is driven into the centre of the wire where it passes through the sleeve, each strand being laid in a groove in the pin. The ends of the strands are then inserted in the terminal-head, which is screwed into the sleeve. The screwing action re-lays the wire above the pin, making withdrawal impossible. An inspection hole in the terminal-head enables the operator to check whether sufficient wire has been inserted to ensure absolute safety.

Only shackle and stud end terminal-heads are in stock at present but other types of terminal-heads, such as bottle-screws and eye-ends, can be made to requirement.

Further details can be obtained from the Tulloch Construction Co. Ltd., 8, Laurence Pountney Hill, London, E.C.4.

Welding Electrode Holders

THE lever of the Handicool 600 and 600 (Insulated) electrode holders is angled close to the handle to give better access to confined spaces. Handle and lever both have D-shape cross-sections to give a compact, well-balanced grip for welding in any position. Holders are designed to be held with a "long" grip at the end of the handle when using high currents, or a "short" grip close to the jaws for good control of the tip. They keep exceptionally cool even after long periods of welding.

Insulating material is tough, non-hygroscopic, resistant to heat and fracture, and renewable. Deep-groove slots machined in the copper alloy jaws, including one along the axis of the holder, simplify overhead welding. The spring, which is behind the guard, is completely protected from spatter and insulated.

Weight of the 600 model is 21 oz. and of the 600 (Insulated) model 23 oz. Maximum current is 600 A. Sizes from 10 s.w.g. to ⅜ in.

Further details can be obtained from the manufacturer, Quasi-Arc Limited, 213, Oxford Street, Bilston, Staffs.

Engine Pre-heater

THE Eltron pre-heater is suitable for use with any petrol- or oil-driven engine with access to a.c. or d.c. mains supply. It does not require garage heating and guarantees the impossibility of frost damage when in operation.

The heater keeps circulating water at approximately 100 deg. F. above the surrounding air temperature, and is claimed to give instant and easy starting. It reduces heavy starting load and doubles the life of the battery, and prevents condensation and "gumming-up" of lubricating oil. It can be used with any anti-freeze mixture.

Further details can be obtained from the manufacturer, Eltron (London) Limited, Accrington Works, Strathmore Road, Croydon, Surrey.

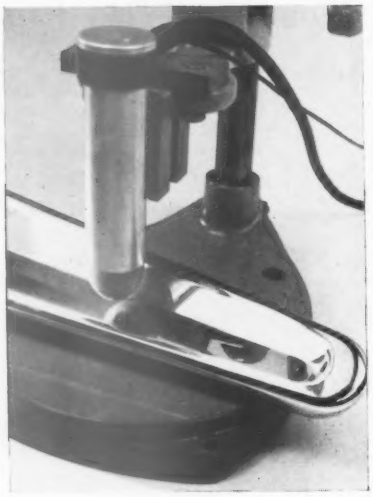
Stroboscope

THE PR.9104 is an improved stroboscope with wide frequency range, high light intensity and short flash duration. The meter scale is calibrated in c/s and r.p.m., and there are facilities for internal and external triggering. It has a built-in electronic phase-shifter and the separate flashtorch is easily handled. Tropicalised the instrument operates on universal a.c. mains electricity supply. A special syncprobe is available.

Further details can be obtained from the U.K. distributors, Research & Control Instruments Limited, Instrument House, 207, Kings Cross Road, London, W.C.1.

Plating Gauge

ORIGINALLY developed as a laboratory instrument for determining the thickness of electro-plated coatings, the B.N.F. Plating Gauge has been modified and redesigned as a robust routine inspection tool for measuring the thickness of nickel plate on steel, brass, or zinc alloy die castings. It is rapid, accurate, and non-destructive.



Once adjusted, it can be used by quite unskilled personnel. Nickel thickness can be measured with an accuracy of ±0.0001 in. for the nickel ranges covered by B.S. 1224. Readings can be made in quick succession—as rapidly as one very five seconds.

The probe tip is a hard steel hemisphere less than 1/8 in. dia. and its small area of contact enables highly localised measurements to be made. Curved surfaces present no difficulty. Life tests have shown that at least 100,000 readings can be made before the probe tip need be replaced. The probe is insensitive to vibration.

The instrument uses the thermo-electric properties of the junction formed between plating and basis metal. A copper probe terminating in a small hemispherical steel tip and heated to constant temperature by small electrical winding is applied to the plated article. Because the temperature of the plating/basis metal interface is dependent on the thickness of nickel immediately beneath the heated probe, the thermo-electric potential generated between the hot probe and a cold part of the plated article varies with the coating thickness. This thermo-electric potential, which is only about 1 mV., is amplified electronically and shown on a meter with three scales calibrated directly in terms of nickel thickness on steel, brass or zinc respectively.

The instrument is zeroed by using two standards provided and the zero control is then locked. Differences in the thermo-electric properties of the coatings and basis metals can be accommodated by adjusting only one control on the instrument set by reference to a third standard provided by the user which is similar to and has the same composition of nickel as the articles to be inspected. Experience to date shows that even if this third standard is not available, measurements can still be made with an accuracy of ±0.0002 in., though there may be nickel compositions not yet examined falling outside this range. The safest procedure is to standardise finally on the type of nickel deposit under examination and an accuracy of ±0.0001 in. nickel is then realised.

Further details can be obtained from the British manufacturer, Nash & Thompson Limited, Hook Rise, Tolworth, Surrey.

Phosphorescent Coating

PITAN phosphorescent coating is suitable for use under conditions of poor lighting and during conditions existing in the hours of darkness, to allow obstacles to be easily observed. It is used in conjunction with a primer or sealing coat. Activated by ultra violet light and radiation energies during the day the coating will emit a phosphorescent glow during hours of darkness. An emulsion paint and two primers are available for use as primer and/or sealer. The coating is supplied for brush application only, and has a covering capacity of approximately 20 sq. yd. per gal. Colour is pale green. Prices are as follows: phosphorescent coating, £12 12s. gal.; thinners, 17s. 6d. gal.

Further details can obtained from the manufacturer, Allweather Paints Limited, 36, Great Queen Street, London, W.C.2.

Grit Blasting in Confined Space

A TECHNIQUE has been evolved over the past year whereby grit blasting can be carried out in confined space, using the Vacu-Blast Major Mark II machine described and illustrated in our February 13 issue.

The work is temporarily shrouded to contain the flying abrasive. The shroud usually consists of a canvas awning stretched over a light angle-iron frame which can be made at low cost to suit individual requirement, and can be modified to suit further needs. The complete blast-cleaning installation remains mobile. To give an example, a steam turbine rotor was placed on trestles and the canvas enclosure erected in a power station, thereby giving maximum facilities for on-site maintenance. The complex configuration of the turbine blading raised no special problem and recovery facilities ensured an immaculate end-product entirely free of spent abrasive.

Further details can be obtained from Vacu-Blast Limited, Wellcroft Road, Slough, Bucks.

Pallet Loader

A NEW pallet loader is claimed to speed up production time, reduce costs, and cut down manpower. Originally designed for moving and stacking bottle crates, it has now been adapted to other fields.

Two machines have been designed. One stacks 30 standard one-doz. 26 oz. cases in five layers of six cases a layer, and turns the pallet through 90 deg. after each layer is stacked to interlock the load. Cases are fed to the loader along a gravity roller conveyor arranged to suit requirements and a timing device permits only three cases to pass forward at a time. These cases are then lifted and moved on the pallet which is housed on a revolving turret. The second delivery of three cases is similarly transferred to the pallet, while a timing device operates moving the turret bearing the partly-loaded pallet through a right-angle. On the original model the pallets were placed by hand on the turret. Developments are under way to arrange for the automatic feed and discharge.

The second model has no turret—the interlocking crates require no bonding. Installation is simple, but a supply of compressed air is required. The machine can be supplied with a built-in motor-driven air compressor.

The loaders will handle approximately a thousand 20-bottle crates, cases, or cartons an hour. The rate can be varied to suit requirements.

Further details can be obtained from Gimson & Co. (Leicester) Ltd., Vulcan Road, Leicester.

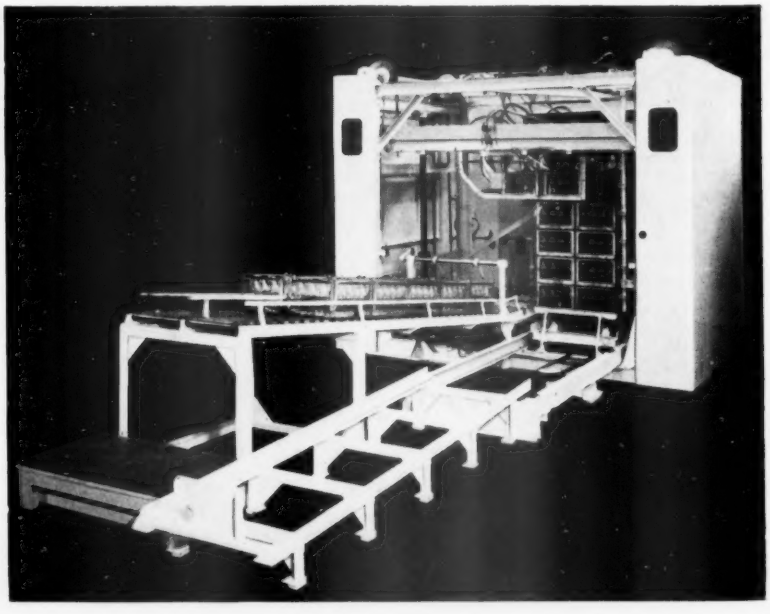
Hot-dip Aluminised Mild Steel Sheet

ALUDIP is mild steel sheet, hot dip, coated with aluminium and is of a type in widespread use in the U.S.A. It is now in production in this country in a limited range of sizes and gauges.

The material has very good resistance to heat up to 700/750 deg. C. and also resists corrosion, especially in sulphurous atmospheres. It therefore can be used for the fabrication of heat exchangers, silencers, and exhaust systems, and can be worked up by the usual sheet metal working processes, including seam and spot welding.

The surface is reasonably smooth and attractive and needs no further surface treatment unless decoration is required.

Further details can be obtained from the British manufacturer, Coated Metals Limited, Palmerston House, Bishopsgate, London, E.C.2.



Control Scheme for A.C. Traction

A traction control system in which a small number of transformer tappings is made to provide a relatively large number of voltage steps is the subject of a patent* granted to the Metropolitan-Vickers Electrical Co. Ltd., and recently published. It will be seen from the accompanying diagram that the tappings are on the secondary of the main transformer and that the voltage applied to the power circuit is boosted by the secondary of an auxiliary transformer (shown in the dotted rectangle). In turn, the voltage across the secondary of this auxiliary transformer is controlled by resistances R_1, R_2 in series with its primary.

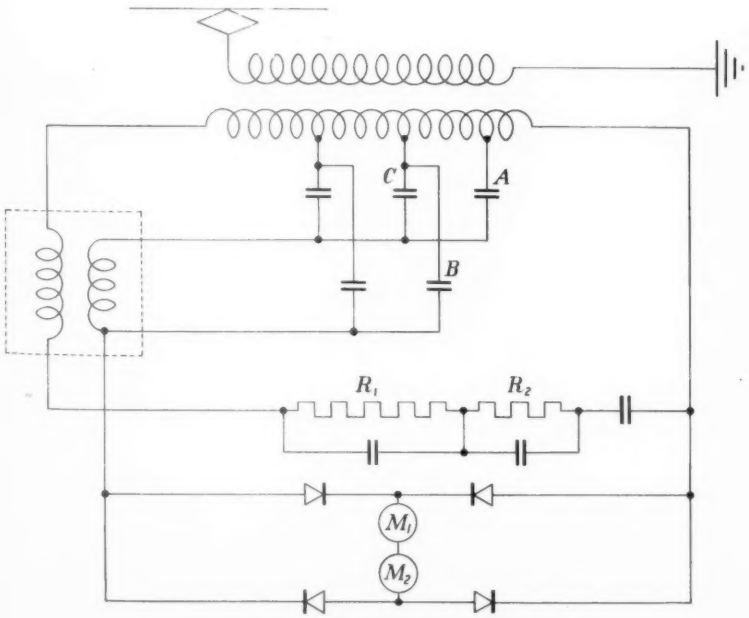
Only three tappings are shown in the diagram, but in practice they would be more numerous. The rectifier system illustrated is not an essential feature of the scheme, although good traction characteristics result from the combination shown.

Considering first the right-hand, or low-voltage, tapping on the main transformer, when the motors are first connected to this point by the closing of contactor *A*, they receive a voltage somewhat above that of the tapping itself, through the action of the auxiliary transformer. The increase is limited at first, however, by the fact that both R_1 and R_2 are in series with the auxiliary transformer primary. Two more voltage steps are then obtained by short-circuiting the resistances in turn, and the circuit values are arranged so that when this has been done, the voltage applied to the motors is the same as that of the next higher transformer tapping.

Contactor *B* is then closed as the first step in the transition process, without affecting the motor voltage. It will be seen that at this stage, with *A* and *B* closed, the auxiliary transformer secondary is connected across the two tappings concerned in the tap-change, and since the voltage across this secondary is arranged to equal that between the main transformer tappings, contactor *A* is carrying virtually no current and may be opened without difficulty at the same time as the two resistance contactors. Contactor *C* is then closed in similar no-load conditions, and with the opening of *B* the auxiliary transformer secondary is again in series with the supply to the motors. Further increases of motor voltage from the second tapping now take place by the operation of the resistance contactors. A similar sequence takes place on the other tappings.

A typical scheme using the above arrangement would have six tappings and six resistance steps on each. All could be running notches if required, but it might be convenient to design the resistances with a limited time rating and to restrict continuous operation to those notches on which the motors are connected direct to a transformer tapping.

* Patent No. 823,547.



Circuit diagram of a.c. traction control system

Institution of Railway Signal Engineers

At a recent technical meeting of the Institution of Railway Signal Engineers in London, with the President, Mr. D. G. Shipp, in the chair, Mr. E. G. Brentnall, Signal Engineer, British Railways, London Midland Region, read a paper, "Lifting Barriers at Level Crossings."

For many years, Mr. Brentnall stated, Parliament had not permitted public road crossings to be made over new or existing lines of railway, except in special circumstances or where the lines were of the type constructed under the Light Railways Act of 1896. During the early years of railways in this country, crossings of railways and roads on the level were permitted and these fell into two main types: (*a*) public carriage way, and (*b*) occupation or accommodation. In recent years some crossings had been displaced by subways or bridges, but today there still remained 4,250 public and 21,300 occupation crossings. The potential dangers of level crossings were early recognised and it was made obligatory by Acts of Parliament of 1845 and 1863 for railways to provide and maintain gates and to provide staff to attend them with suitable accommodation for the latter.

Gates at public crossings could be worked mechanically from a signalbox, by power, also from a signalbox (a comparatively recent development), and by hand by gate attendant. It was recognised that the level crossing was a bane to road and rail users alike; but while some relief could be given at busy places by bridges and subways, at some spots it was physically impossible and the question of cost had also to be considered. The level crossing therefore would have to be endured as long as railways existed.

The security of level crossings depended on observance of safety instructions. In recent years it had become increasingly hard to obtain men of sufficient integrity particularly in modern labour conditions where the number of relief men required was so much greater than in past years. The disadvantages of the present system had been increased by changing conditions unforeseen in early days. There had always been the necessity for closing the gates early enough to ensure that trains were not checked. Because of the slow movement of heavy gates it was usual for a crossing to be closed at least 5 min. for the passage of a train and sometime longer if two trains passed at close intervals. There had always been delays to road traffic and while these were not so serious with the slow moving traffic of the last century, they caused considerable interference with the intense, high-speed motor traffic of today.

Railway construction in other countries, Mr. Brentnall added, began some time after railways were working in Great Britain. Abroad, they often had no statutory obligation to fence the lines or to man public level crossings. Where some form of protection was considered necessary road signs were used. In later years, the increase in density and speed of motor traffic made some form of physical obstruction advisable and lifting barriers were lighter and quicker in operation and could be remotely operated from a signalbox or even automatically by the trains themselves. This type of crossing was now in active use on the Continent and in the U.S.A.

Lifting Barriers in Britain

The idea of providing lifting barriers was not entirely new to the United Kingdom. Lifting barriers, operated mechanically at site, had been provided at Warthill, on the York—Hull line. They were brought into use in October, 1952, and modifications suggested by the Ministry of Transport & Civil Aviation were introduced in December, 1954. The crossing was now equipped with twin flashing red lights in each direction and a single fixed red light on each barrier with a circular group of reflectors placed on a red target in the centre of each boom. In 1954 permission was received from the Minister to substitute lifting barriers for gates as required but there was no opportunity of operating the barriers otherwise than at site; so only small economies could be affected.

A summary of the conclusions of the party which had inspected level crossings on the Continent in 1956, stated that Continental methods of operating level crossings would prove suitable in Great Britain without prejudice to safety. Lifting barriers could be used in general to replace gates at most attended crossings. Automatic and remote operation could also be adopted at selected places after trials. The belief that pedestrians and children must be afforded full protection at level crossings against the dangers of the line was illogical, as there were many places where adults and children had free access by wicket gates, footpaths and accommodation crossings with stiles.

Mr. Brentnall then described the different types of installations inspected on the Continent. In his opinion there should be a con-

siderable future for the lifting barrier type of crossing in this country which would bring many advantages to road users; but the interest, help and collaboration of local authorities would be necessary.

Half-Barriers

Colonel D. McMullen, Inspecting Officer of Railways, Ministry of Transport, said that he was often asked why there were no short-length barriers at a crossing. He was firmly of the opinion that at a manned crossing and at a remotely controlled crossing the barriers must cover the full width of the road, and that with automatic operation the barriers must cover only half the road. The reason for the latter requirement was that the automatic crossing depended entirely for its safety on the very fine timing between the lowering of the barrier and the arrival of a fast train, which acted as a deterrent to motorists zig-zagging round the barriers. It was quite possible to get this fine timing with manual operation. It was not safe to have half-barriers at a crossing operated manually, because the barriers could not come down close enough to the arrival of the train and motorists would get impatient and zig-zag round it. For the same reason it was essential to have a short barrier at an automatic crossing.

The automatic half-barrier had great economic advantages from the railway point of view, was favoured on the Continent, and was being installed on some railways in Asia.

Mr. Brentnall, he went on, had referred to the very onerous requirements of the Ministry of Transport. Some of the restrictions were perhaps onerous, one being the restriction of 60 m.p.h. on the speed of trains on lines on which half-barriers were installed. This was because of the disparagement in the time between the falling of barriers and the arrival of the train due to varying train speeds. In instances where two trains were approaching the level crossing at the same time, in opposite directions, one perhaps being nearer the crossing than the other, the barriers would be down for a longer period, offering temptation to impatient motorists. In Germany and the U.S.A. this problem had been overcome by measuring the speed of the train as it approached the crossing.

Parliamentary Notes

Transport of Mail by Train

Mr. W. R. Williams (Openshaw, Manchester—Lab.), in the debate on the second reading on November 25 of the Post Office Bill, said he noticed in the annual report of the Post Office the statement that " The Post Office keeps in close touch with British Railways on their modernisation plans so far as they may affect the mails." His own view was that the relationship could be more effective.

The diesel trains now running on many lines had not the load capacity of the old vans. The result had been dislocation of mails.

He was not too happy about the security of mails. One could see the number of Post Office bags crowding the platforms at termini. Nobody was in view ostensibly to watch their security.

The postal parcels service was not satisfactory. In his young days in the Post Office they did not have to wait for trains late in the day. If they had a certain number of parcels, they went into what were called the combined mails, and the railways used to take them on by the first available train.

There should be close liaison between British Railways and the Post Office at an early stage in the re-building of stations, to ensure proper facilities, including conveyors, for handling mails without risk of pilferage.

Regional Accounts

Mr. Percy B. Browne (Torrington—C.) has given notice to ask the Minister of Transport on December 16, if he will give a general direction to the B.T.C. to publish its accounts on a Regional basis, and to ensure that they are further broken down to show separate figures for freight and passenger traffic.

Closing of Highland Railway Stations

A deputation of 12 representing local authorities in the Scottish Highlands, the Highlands & Islands Advisory Panel, and the Scottish Tourist Board, received on December 2, by Mr. Ernest Marples, Minister of Transport, appealed against the B.T.C. proposals for the closing of railway stations and branch lines north of Inverness.

The deputation put forward the case for both retention and improvement of existing railway services.

Mr. Marples' response to the statement of the deputation was regarded by Provost Wotherspoon, of Inverness, leader of the delegation, as encouraging. " But he left us thunderstruck," stated the Provost, " when he intimated that he had no power to act, as the closing of railway stations and branch lines was a matter for the Commission to decide." Apparently all that the Highland local authorities could do now, he added, was to approach the Commission.

Questions in Parliament

Victoria Line Tube

Mr. C. F. H. Gough (Horsham—C.) asked the Minister of Transport on December 2 whether he had now authorised the B.T.C. to proceed with the construction of the Victoria line tube.

Mr. Ernest Marples, in a written answer : No, but I am carefully studying the London Travel Committee's report.

Radio-active Materials by Rail

Mrs. Joyce Butler (Wood Green—Lab.) asked the Minister of Transport on December 2 when he expected the revised regulations for the transport of radio-active materials by rail to be published.

Mr. Ernest Marples, in a written answer : I understand that the B.T.C. has almost completed its consultations with interested bodies, but that it cannot yet say when the regulations will be available in their revised form. It is pressing ahead with the revision as quickly as possible.

Monorail Prospects

Mr. George Strauss (Vauxhall—Lab.) asked the Minister of Aviation on November 30 what consultations he had had with the Minister of Transport with a view to making London Airport more accessible to passengers travelling to and from central London.

Mr. Duncan Sandys : I am in close touch with my right hon. Friend on this subject.

Mr. Strauss : Discussions have been going on for years about the possibility of a rail link, or monorail, or something of that sort. Is there any hope of a conclusion being reached ?

Mr. Sandys : I should think discussions will go on for a very long time yet. The first task is to improve the road . . . I am told that when the work is completed, the journey between the Cromwell Road Air Terminal and the airport will not take more than some 23-25 min. If we were to introduce a monorail or a similar system, we might cut 10 min. off that time. Up to now these schemes have foundered owing to their high cost, and to the fact that other schemes have claimed priority in expenditure.

Staff and Labour Matters

Railway Wage Claim

A meeting of the Railway Staff National Council took place on December 3 at which the Commission's side of the council, under the chairmanship of Sir John Benstead, gave its reply to the union's claim for a substantial increase in pay for railway salaried and conciliation staff.

The main grounds on which the union based its claim were: cost of living, comparison with increases granted in other industries, and the fact that the staff should receive some benefit from the savings accruing from the modernisation plan and the various economy measures which have been made.

In declining the claim, the Commission's representatives urged the union representatives to reconsider the position with a view to awaiting the outcome of the Independent Pay Committee's investigations in regard to the relativity of railwaymen's pay with the position in outside industry. The N.U.R. representatives stated that a full report on the proceedings would be made to the union's Executive Committee and the Commission would be advised of the decision reached.

If the N.U.R. decide to press the claim to the next stage of the machinery instead of waiting for the Pay Committee's report, the claim will go to arbitration before the Railway Staff National Tribunal.

N.U.R. and Joint Consultation

Following a meeting which the Chairman of the British Transport Commission had with the General Secretary and other representatives of the National Union of Railwaymen on December 2, it was announced that the N.U.R. had now agreed to resume joint consultation with representatives of the Commission at all levels.

SOCIETY OF CHEMICAL INDUSTRY, CORROSION GROUP MEETING.—A discussion on three research papers will take place at a meeting of the Corrosion Group of the Society of Chemical Industry at 6 p.m. on December 16, at 14 Belgrave Square, London, S.W.1. The papers have all been published recently in the *Journal of Applied Chemistry* and will be introduced briefly by their authors.

HALE & HALE (TIPTON) LIMITED.—The net profit of Hale & Hale (Tipton) Limited, for the year ended August 4, 1959, was £22,209, compared with £18,028 for the preceding year. An interim ordinary dividend of 5 per cent has been paid. The board proposes a final ordinary dividend, less tax, of 15 per cent, making 20 per cent for the year. The Chairman, Mr. R. C. Leppington, states in his review that since the relaxation of purchase tax on commercial vehicles, there has been a steady increase in orders. Demand is now overtaking productive capacity, and delivery dates are being extended. Although the foundries are very busy, profit margins are insufficient compared with the hazards of the malleable industry. The firm is still suffering from depressed selling prices, but it is believed that with increased demands products prices will rise. Plans for the development of plant are well in hand. On completion of schemes in hand the major portion of the output will be produced by mechanised methods.

Contracts and Tenders

Diesel shunting locomotives for the Nigerian Railway Corporation

Maschinenbau Kiel A.G. (MaK) is building another six 400-b.h.p. diesel-hydraulic three-axle shunting locomotives for the Nigerian Railway Corporation, making 10 in all, but these last six are to have roller bearings for all side-rod crankpins.

Nine electric cranes have been ordered by British Transport Docks for No. 4 Quay, Kings Dock, Swansea. Four of the cranes will be of 10-ton capacity for the discharge of bulk dry cargoes by grab, and five, of 7½-4-ton lift, will be for the dual purpose of loading and discharging general cargoes and of discharging bulk dry cargoes. The contract for the cranes, which will replace obsolete hydraulic appliances of lower capacity, has been awarded to Stothert & Pitt Limited, of Bath. The scheme for the modernisation of No. 4 Quay, Kings Dock, Swansea, also provides for the renewal of the crane track, the re-paving of the quay flush in concrete, and additional railway facilities.

Rheinstahl Siegener Eisenbahnbedarf has received an order from Turkey for 30 four-axle self-discharging wagons of 70 cu. m. (2,460 cu. ft.) capacity, with pneumatically-operated doors.

J. W. Roberts Limited: Supply of Limpet Asbestos for the construction of Enfield/Chingford electric stock at York Carriage Works.

R. Costain Limited: Supply of fuel tank enclosures at Heaton and Gateshead Motive Power Depots.

Deloro Stellite Limited and John Spencer Limited: application of Stellite to certain components of the Enfield/Chingford electric stock which is being constructed at York Carriage Works.

Felco Hoists Limited: electric pulley blocks and cables for use in the points and crossings shop at Park Lane, Newcastle.

Worthington-Simpson Limited: supply of an air compressor and ancillary equipment for Pelaw new power operated signalbox.

Siemens & General Electric Railway Signal Co. Ltd.: extension of control and point operation at Huddersfield Signalbox.

Edmundsons Construction Co. Ltd.: installation of electric lighting in the new office building at Middlesbrough for the Traffic Manager, Tees-side.

The Special Register Information Service Export Services Branch, Board of Trade, has received calls for tenders as follow:

Queensland:
Two diesel-mechanical locomotives of 2-6-0 wheel arrangement, 3-ft. 6-in. gauge.
The issuing authority is the Queensland Government Railways. Bids should be sent to the Secretary, Commissioner for Railways, Adelaide Street, Brisbane, Queensland. The closing date is January 14, 1960. The Board of Trade reference is ESB/28127/59.

Further details relating to the above tenders together with photo-copies of tender documents can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

Notes and News

B.R.S. Speed Limit Agreement.—British Road Services 30-m.p.h. Speed Limit Agreement, formulated in 1957, is to be brought into force on January 4, 1960. The essence of the agreement is to reduce the working day of driving staff by 1 hr., with a normal maximum of 10 hr., without loss of pay or a lessening in the amount of work done during a working day. This is being achieved by revising running schedules, adjusting all other working schedules and adding a 15 per cent bonus to basic rates.

Presentation to Sir Francis Glyn.—Lord Rusholme, Chairman of the London Midland Region Area Board of the British Transport Commission presided at a dinner at Euston on December 2, when a silver salver was presented to Sir Francis Glyn to mark his retirement from the Board. The dinner was attended by three directors of the former London Midland & Scottish Railway, Sir Robert Burrows, Sir Samuel Beale, and Lord Glyn, with the members of the London Midland Region Area Board, Mr. L. Cooke; Mr. J. Haworth; Major-General Sir John Kennedy; Major-General G. N. Russell; Mr. R. F. Summers; Mr. David Blee, General Manager; and the Board Officers.

Lord Rusholme, right, making the presentation to Sir Francis Glyn

Oil Tank Wagons Derailed in the London Midland Region.—A 29-wagon goods train ran into sidings buffers at Upper Holloway Goods Depot, British Railways, London Midland Region, last week. Nine of the wagons, loaded with diesel oil, were derailed and telescoped. About 9,000 gal. of oil was lost before the wagons could be righted. No one was hurt.

Swansea & Mumbles Railway to close in January.—The 150-year-old Swansea and Mumbles Railway will be closed at noon on January 5. This has been announced by Thos. W. Ward Limited, the demolition contractors. In future the five-mile coastal route will be served by buses. The section from Southend to the terminus at Mumbles Pier was closed on October 12 to enable a new section of road to be built.

Motorcar Lands Astride Track in Cutting.—One man was killed but the rest only slightly hurt when a motorcar containing seven people failed to take a bend at Goldicote, near Stratford-on-Avon, went through a fence, rolled 62 ft. into a railway cutting and stopped the right way up astride the track between Kineton and Stratford. The car, badly damaged, was lifted out of the cutting with the help of a breakdown train.

Thos. W. Ward Limited Profits Increase.—Following the maintained 5 per cent interim dividend by Thos. W. Ward Limited there is a final dividend of 20 per cent for the year to June 30, 1959, against the previous final distribution of 10 per cent dividend and 5 per cent bonus. A 100 per cent scrip issue also is to be made. Group profit has risen from £2,599,158 to £2,775,667 and, after lower tax, the balance is up from £1,173,710 to £1,442,519.

" As Long as They're Happy."—An excellent performance of Vernon Sylvaine's comedy " As Long as They're Happy " was given by the Southern Railway Dramatic Society at the Scala Theatre last week. The good work which this society does is well known and the high level of its latest production, especially in view of the inclusion of many new members, was particularly gratifying. Mr. Elvey Evans gave a very good portrayal of the part of Bobby Denver, the teenagers' singing idol. The Misses Angela Viney, Patricia Kendrew, and June Thomas, all in their variety of ways pursuers of Bobby Denver, were excellent in the roles of Gwendoline, Linda and Stella Bentley. Mr. Ronald Varney, who played John Bentley, Mr. John Ross as Hermann Schneider, and Mr. Alan Wood as Peter Pember, were well cast. Miss June Earnest was in good form as Patricia. Those with shorter appearances, who yet acquitted themselves more than adequately, were Miss Mildren Dutton as Pearl, Miss Pamela Cowland as Corinne, Mr. William Makepeace as Michael Kenley, and Mr. Bernard Murray as Barnaby.

Smiths Torrington Air Impellers.—Resulting from an agreement with the Torrington Manufacturing Company of Torrington, Connecticut, U.S.A., a newly formed department at Witney of S. Smith & Sons (England) Ltd., will manufacture Torrington air impellers and market them throughout the world, with the exception of North and South America. Products of the British company will be known as Smiths Torrington air impellers. Standard sizes are from

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1½ in. to 11 in. dia. for centrifugal types and from 3 in. to 24 in. dia. in axial types. These cover most industrial and domestic air-movement requirements including refrigeration and electronic cooling.

New Japanese Subsidiary for the General Electric Co. Ltd.—The General Electric Co. Ltd. has formed a Japanese subsidiary company with a capital of £10,000. It is called the General Electric Co. of Japan Ltd. and is to carry on the business of electrical, electronic, nuclear, mechanical, constructional, civil, and general engineers.

W. H. Dorman & Co. Ltd. London Office.—W. H. Dorman & Co. Ltd., of Stafford, announces that the firm's London office is now at 1, Hay Hill, W.1, tel. Hyde Park 1778–9. The address for inland telegrams is Dormdiesel Piccy London, and for cables, Dormdiesel London. The London Sales Manager is Mr. R. B. Lawrence and the Assistant London Sales Manager, Mr. R. J. Trimmer.

Sections of Former M.G. N.R. Line to be Highroads.—Norfolk Highways Committee decided recently to proceed with a scheme to buy stretches of the former Midland & Great Northern Railway line, parts of which are abandoned, for conversion into roads. It is proposed to buy 12 miles of line from Aylsham to Potter Heigham, to make a new road for holiday traffic between the Midlands and the Norfolk Broads. The County Surveyor has stated that the cost of widening the existing roads would be more than £1 million. The cost of using the 12 miles of line which was already almost straight would be £700,000. There are also proposals to buy five other stretches of the line to provide better roads to the Norfolk coast.

Expansion Scheme for Stainless Steel.—A £2,000,000 expansion scheme for Shepcote Lane Rolling Mills Limited, Sheffield, owned jointly by Firth-Vickers Stainless Steels Limited, and Samuel Fox & Co. Ltd., has been approved by the British Iron & Steel Board and the British Iron & Steel Federation. The new plant is being installed to meet an increasing demand for stainless steel, a demand which has been particularly apparent over the past three months and which stems from a greater use of the material by manufacturers of consumer products. It is understood that the plant will be used mainly for the production of stainless steel strip in coil form. At present the mill produces about 400 tons of coiled strip a week and it is anticipated that when the expansion programme is completed, production capacity will be increased by about 50 per cent.

Compensation for Road Vehicles Acquired by B.T.C. Under 1947 Act.—The British Transport Commission, which acquired long-distance road transport undertakings under the Transport Act, 1947, was required to compensate the former owners in accordance with a formula prescribed by Section 47 of the Act. It had been established by a test case that in transactions of this kind there was no sale within the meaning of Section 17 of the Income Tax Act, 1945. Therefore balancing allowances or charges fell to be assessed on the basis of "open market value" under Section 60 of that Act. Assessments to balancing charges were raised on the ground that the values of the vehicles as computed for compensation represented their market value at the date of acquisition. In two cases sponsored by the Road Haulage Association this ruling was contested. It was maintained that a price fixed by a formula could not be "open market value," and that some figure other than the compensation received for the vehicles must be arrived at. The Special Commissioners of Income Tax held that compensation received from the B.T.C. under the 1947 Act was not to be regarded as "open market value." They determined this value by reference to an independent valuation having regard to the market conditions existing at that time, and arrived at amounts totalling in one case the equivalent of just under 25 per cent of the aggregate compensation, and in the other to just over 50 per cent of the compensation for the vehicles. This case, it is stated, may go to the High Court.

Toledo Woodhead Springs Limited, Dividend.—The final dividend for the year to August 30, 1959, by Toledo Woodhead Springs Limited is 10 per cent making 15 per cent, compared with 20 per cent, including 2½ per cent special interim dividend the previous year. The net profit is £45,779 (£46,374).

Dorman Long & Co. Ltd. Interest in West African Companies.—Dorman, Long & Co. Ltd. has acquired a controlling interest in T.A. Holdings Limited, a private United Kingdom company with an issued share capital of £108,869 which has two overseas subsidiary companies, Amalgamated Engineering Co. Ltd. and Amalgamated Engineering Co. (Ghana) Ltd. Amalgamated Engineering Co. Ltd. is registered and carries on business as general engineers, steel fabricators and tank makers in Nigeria. Amalgamated Engineering Co. (Ghana) Ltd. is registered in Ghana and carries on similar activities there. Dorman, Long & Co. Ltd. will provide the finance and technical aid necessary to expand the activities of the two West African companies.

International Road Traffic Customs Convention.—A simplified Customs procedure for British road goods vehicles operating in certain Western and Central countries comes into force on January 7, 1960. The United Kingdom has ratified the Customs convention on the international transport of goods under cover of T.I.R. (Transport Internationale Routier) carnets. The convention reduces Customs formalities for road vehicles carrying goods across more than one frontier. At present goods exported by road vehicle or container are always subject to examination by the Customs of the exporting country and at each frontier. For goods sent under the convention, the Customs will normally inspect only in the countries of origin and destination, and not *en route*. The T.I.R. carnet will also serve as a bond, and the carrier will not be subject to the payment or deposit of duties *en route*.

Crompton Parkinson Limited, in 1958-59.—Mr. Albert Parkinson, Chairman, Crompton Parkinson Limited, stated at the annual general meeting of the company in London last week that the year had opened with prospects of a revival in industrial and commercial activity which had since raised certain sections of the company's business activity to new high levels. During the year a further important order had been placed by the British Transport Commission for complete sets of locomotive equipment in connection with its modernisation programme. The manufacture of this order, which was the largest ever placed by the B.T.C. for diesel-electric equipment, had commenced at Chelmsford and elsewhere and would continue for the next two years. During the year the directors appointed Mr. R. R. Kenderdine to be a Director and a Managing Director of the parent company. They also appointed Mr. J. T. H. Macnair to the Board. The consolidated net income of £1,253,021 for the year ended June 30, 1959, shows an increase of £140,592. A final dividend of 9 per cent on the ordinary stock was recommended, which with the interim of 5 per cent, makes a total of 14 per cent for the year. This compares with 12 per cent for the previous year.

Esso Petroleum Co. Ltd. Change of Address.—The Technical Sales Department of the Esso Petroleum Co. Ltd. has moved from 83–85, Albert Embankment, S.E.11, to Faggs Road, Feltham, Middlesex, tel. Feltham 3677, telex. Essotech, London.

Glendon & Rushton and Hathern Stations to Close.—British Railways, London Midland Region, is to close Glendon & Rushton and Hathern Stations from January 4. Glendon & Rushton is on the former Midland Railway main line between Kettering and Market Harborough. Parcels and passenger train merchandise will be dealt with at Kettering. The present arrangements for goods train traffic will continue. Hathern is on the same main line between Loughborough Midland and Trent Junction. Parcels and passenger train merchandise will be dealt with at Loughborough. Goods traffic in less than wagon-loads will be dealt with at Loughborough, full loads and livestock except traffic for private sidings at Kegworth, and coal, coke and patent fuel as consigned. There are bus services in the areas served by the two stations.

"Travellers' Charter" Put Before M.Ps.—Control by Parliament of British Railways, with direct ministerial responsibility, and income tax relief for people who have to travel to work by rail, are two of the suggestions in a "Travellers' Charter," put before a number of M.Ps for south-eastern counties recently. The document and accompanying memoranda were drawn up by the committee of the Federation of South Eastern Railway Travellers' Association, representing eight local organisations with a membership of about 5,000. Other suggestions include one that a season ticket holder should not be expected to pay the full standard rates if he travels from a station where there is little hope of a seat, and another that big housing developments should be discouraged in areas where they would engender further daily travel to London, until the railways can give the assurance of being able to handle the extra traffic.

Reduction in Duties on Imported Machine Tools.—The import duty on machine tools has been reduced from 17½ to 10 per cent *ad valorem* and the system of refunding the duty in certain cases has been ended. Previously a user who had paid 17½ per cent duty on an imported tool could obtain remittal of the duty if he could establish that no comparable machine was obtainable from domestic industry or that the delivery date was too long. Nearly all imported big machines such as large gear grinders, were freed from duty. The new system follows exactly the proposal originally made to the Board of Trade by the Machine Tool Trades Association. The M.T.T.A. has stated that the action by the Government will help to remove the charge of protectionism from the industry and enable customers to reveal their preferences for British or imported machines more readily. It will also reduce the cost of importing machines.

Road and Rail Association Formed.—The primary aim of the newly formed Road & Rail Association is stated to be "to encourage a more effective use of the nation's internal freight transport facilities, and this includes not only road and rail but also inland waterways and coastal shipping." Among the founder members are: Lord

Amwell, who was Under-Secretary of State for Air 1929-31, Parliamentary Secretary to the Ministry of Transport, 1940-41, and Parliamentary Secretary to the Ministry of Aircraft Production, 1941-42; Mr. Bernard Braine, Conservative M.P. for S.E. Essex; Sir Kenneth Grubb, Chairman of the House of Laity of the Church Assembly, and a Director of C.S. Services Limited; Mr. David Hardman, Labour M.P. for Darlington, 1945-51; and Mr. Claude Simmonds, Managing Director of C.S. Services Ltd. The address of the Association is 5, Carlos Place, W.1, and the joint Secretaries are Mr. Patrick Thursfield and Mr. Ronald Ramirez. Editorial reference to the Association is made elsewhere in this issue.

Record Production at Margam Steelworks.—The Steel Co. of Wales Ltd., has announced steel production and rolling mill record outputs at the Abbey Works, Margam. During the week ending November 29, 55,265 ingot tons were produced and last week the total tonnage produced was 55,857 ingot tons.

New Wolf Electric Tools Service Branch at Bristol.—Wolf Electric Tools Limited, Bristol branch, has moved into new and larger premises at 1-3, Dean Street, Bristol, 2. The repair shop equipment includes 3,000-V. apparatus for testing Wolf double-insulated tools. The original Wolf Service branch at Cheltenham Road, Bristol, has been vacated. All enquiries should be made to the new Dean Street address, tel. Bristol 22288.

Road Casualties in October.—The Minister of Transport, Mr. Ernest Marples, has stated that there were 4,497 more casualties on the roads of Great Britain in October this year than in that month of 1958. This figure represents an increase of nearly 17 per cent. Traffic on main roads, as estimated by the Road Research Laboratory was 11 per cent heavier than a year ago. Altogether 655 people were killed on the roads, 67 more than in October, 1958. The seriously injured numbered 7,586, an increase of 1,286; and the slightly injured, 22,977, an increase of 3,144. Accidents to motor cyclists, drivers of motor-scooters and mopeds and their passengers again accounted for the main increase in casualties.

Car Parks Over Southern Region Stations.—Sir Philip Warter, Chairman of the Southern Area Board, British Transport Commission, stated earlier this week that car parks might be built over Cannon Street, London Bridge, and Victoria Stations, Southern Region. The schemes are as follows: Cannon Street: A car park over the tracks behind the main office block being built, to accommodate 525 cars; Victoria: by rebuilding the station frontage with office blocks and moving the bus station above ground, connected by escalators to the station concourse and the Underground station parking might be found for more than 1,000 cars; London Bridge: Replanning on a similar scale is being studied by a firm of consultants. The Southern Area Board is also considering the development of 500-600 stations. One scheme may provide for building over the track at Streatham Hill station with offices and car parks.

New Master Schedule of Wrought Steels.—The British Standards Institution has published the first part of B.S. 3141, a master schedule of wrought steels. It deals with carbon steels, and further parts to be published later will deal with alloy steels, and steels with specified mechanical properties but without detailed chemical composition. As a result of the schedule, those concerned in drafting British standards for steel will not be able to add to existing specifications without showing justification for it. Instead they will be required to choose a suitable specification from the master schedule. B.S. 3141, part 1 was prepared by a widely representative committee bringing together manufacturers and users of steel, Government departments, the engineering institutions and research interests. The chairman of the committee was Mr. Gordon Weston, Technical Director of the B.S.I. Copies of the schedule are available from Sales Branch, British Standards Institution, 2, Park Street, London, W.1, price 10s.

Steel, Peech & Tozer Expansion Scheme.—Steel, Peech & Tozer Limited, a branch of the United Steel Co. Ltd., is to spend £10,000,000 on the replacement of all its existing open hearth steel melting furnaces by six electric arc furnaces of 110 tons capacity each. This will increase the firm's steelmaking capacity by one-third in some five years' time. The capacity of ingot steel output will be increased from 1,000,000 to 1,350,000 tons a year. When the scheme is completed, Steel, Peech & Tozer will have the largest electric steelmaking plant in the world. The first, swing-roof type of furnace, is to come into operation by the beginning of 1963. The first two furnaces at the Templeborough melting shop will be closed down in two years' time for the changeover and the others will be taken out at intervals, but arrangements have been made to maintain the level of production during the process. Almost everything except the electrical equipment is to be made by the Distington Engineering Co. Ltd., a United Steel subsidiary. Negotiations are in progress with the electricity supply authority, for when the electric arc furnaces are all working the plant's power needs will be six times as high as at present. The scheme also provides for installation of new steam generating equipment and a new ingot mould preparation building.

Cambrian Railways Institute Jubilee.—To mark the golden jubilee of the Cambrian Railways Institute at Oswestry, a banquet was held at the Wynnstay Hotel, Oswestry, on November 23. Mr. O. Veltom, District Traffic Superintendent, Oswestry, Chairman of the Oswestry Branch of the Staff Association, presided. Mr. R. F. Hanks, Chairman of the Western Area Board of the B.T.C., proposed the toast to the Mayor and Borough of Oswestry, which was responded to by Councillor A. A. De Vere Beauclerk, the Mayor. Mr. J. R. Hammond, General Manager, Western Region, and President of the British Railways Staff Association, Western Region, gave the toast to the Cambrian Railways Institute. Mr. F. A. Peters, Chairman of the Staff Association, Central Wales Area Council, and Treasurer of the Oswestry Branch, replied. "Our Guests" was proposed by Mr. E. Johnson, Secretary of the Branch and replied to by Mr. R. A. Smeddle, Chief Mechanical & Electrical Engineer, Western Region. Other guests included Mr. M. G. R. Smith, Chief Civil Engineer, Mr. S. G. Ward, Regional Establishment & Staff Officer, Mr. W. R. Stevens, Divisional Traffic Manager, Wales, and Mr. C. J. Rider, Public Relations & Publicity Officer.

Antofagasta (Chili) & Bolivia Railway Co. Ltd. Results.—The group net loss of the Antofagasta (Chili) & Bolivia Railway Co. Ltd. for 1958 was £263,361. The loss from operating the railways and waterworks was £16,177, which with the losses on working the Bolivia Railway Company and Aguas Blancas Railway Company lines gave a loss of £423,182. The dividend arrears on the 5 per cent preference stock total £100,000 subject to tax. Gross receipts were £961,648 less than in 1957. Working expenses decreased by £655,589. The ratio of expenditure to gross receipts was fractionally under 100 per cent compared with 91.87 per cent in 1957. From February 18, 1959, the company was obliged to suspend its operation of its own lines in Bolivia and of those which it leases from the Bolivia Railway Company. The Bolivian Government has made no approach to the Antofagasta (Chili) & Bolivia Company, and no definite solution is in view. Meanwhile, the railway, which remains the property of the company, is being operated under Bolivian fiscal administration.

"Quick Cook Unit" for Station Refreshment Rooms.—A new type of cooking unit capable of producing a wide variety of meals, is being introduced by British Transport Hotels & Catering Services in several new or modernised refreshment rooms. Equipped to provide a quick service of meals freshly cooked in full view of the customer, the "Quick Cook Unit" has already been installed in several places, including the "Midland Bar" at St. Pancras, and the cafeteria at Charing Cross. More are planned, as they have been so well received by the public. Incorporated are a refrigerator, storage for shell eggs, a griddle plate heated

Mr. R. F. Hanks, Mr. J. R. Hammond, and officers of the Western Region at the golden jubilee banquet of the Cambrian Railways Institute, Oswestry

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either by gas or electricity, a grill, a rotary sausage grill, electric toaster, and sections for warming purposes. Of stainless steel, the unit is 7 ft. wide, 2 ft. 4½ in. deep, and 6 ft. 10 in. high. The working surface is 3 ft. from floor level. The back forms a duct with grease filters, and this can be connected to an existing mechanical ventilating system. The electric loading is 7 kW. when working with the gas griddle and grill, and 12 kW. with all-electric operation. The unit was specially designed by British Transport Hotels & Catering Services, and was supplied by W. M. Still & Sons Ltd. A miniature type of this cooking unit has also been developed for railway buffet cars.

Forthcoming Meetings

December 14 (*Mon.*).—Institute of Transport, in the Jarvis Hall (R.I.B.A.), 66, Portland Place, W.1, at 5.45 p.m. Spurrier Memorial Lecture "Government and roads and road transport," by Mr. L. J. Dunnett.

December 15 (*Tue.*).—Institute of Locomotive Engineers, at the Institute of Mechanical Engineers, 1, Birdcage Walk, S.W.1, at 5.30 p.m. Paper on "Methods of reducing flange wear on diesel and electric bogie locomotives," by Mr. W. L. Topham.

December 16 (*Wed.*).—Permanent Way Institution, London Section, at the Headquarters of the British Transport Commission, 222, Marylebone Road, N.W.1, at 6.30 p.m. Paper on "Tools and equipment, past, present, and future," by Mr. D. R. James.

December 16 (*Wed.*).—Railway Students' Association, at the London School of Economics & Political Science, Houghton Street, Aldwych, W.C.2, at 6.15 p.m. Paper on "The British locomotive industry," by Mr. G. T. Owen, Chairman, Locomotive & Allied Manufacturers' Association of Great Britain.

December 17 (*Thu.*).—British Railways, Western Region, London Lecture & Debating Society, in the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5.45 p.m. Railway quiz—Questions on railway operation and administration. Question master, Mr. H. G. Bowles.

December 17 (*Thu.*).—Institution of Locomotive Engineers, at the Dorchester Hotel, Park Lane, W.1. Dinner and dance.

December 17 (*Thu.*).—Institute of Transport, East Midlands Section, in the City Transport Recreation Club, Leicester, at 1 p.m. Paper on "British Transport Commission—public relations," by Mr. E. Merrill, Chief Public Relations Officer, B.T.C.

December 17 (*Thu.*).—Diesel Engineers & Users Association, in the Institute of Marine Engineers, The Memorial Building, 76, Mark Lane, E.C.3, at 2.30 p.m. "Report on heavy oil engine working costs and performance, 1958/59," and an informal discussion on "operating problems."

December 18 (*Fri.*).—Railway Correspondence & Travel Society, London Branch, at the Railway Clearing House, Eversholt Street, N.W.1, at 7.15 p.m. Paper on "The contribution of locomotive testing to dieselisation on the Western Region, with some reference to comparative steam and diesel locomotive performance," by Mr. S. O. Ell, Assistant to the Chief Mechanical Engineer, British Railways, Western Region, Swindon.

December 18 (*Fri.*).—Institute of Transport, Tees-side Section, at the Cleveland Scientific & Technical Institution, Middlesbrough, at 6.30 p.m. Debate: "That the unrestricted growth of private transport, other than for hire or reward, for goods and passengers, is undesirable for the community at large."

OFFICIAL NOTICES

THE NIGERIAN RAILWAY CORPORATION

Invites applications for the following posts in the Signalling Department:

(a) ASSISTANT SIGNAL ENGINEER
(b) SIGNAL INSPECTOR

Duties Post (a): The Assistant Signal Engineer will be responsible to the Signal Engineer for the preparation of Signal and Telecommunication Schemes, which include Mechanical Signalling (Single Wire and Double Wire) Relay Interlocking, and Colour Light Signalling generally, telegraphs, Electric Signal Repeaters, Block Working, small automatic telephone exchanges, Telephone Train Control and Magneto Telephones and the Installation, testing and maintenance of same. He will also be required to inspect all existing apparatus and works in progress.

Post (b): The Signal Inspector will be required to undertake the installation and repair of Double Wire Signalling apparatus.

Qualifications: Post (a): Candidates must have a sound technical and practical experience of the principles of Signalling and communications as regards construction, installation, repair and maintenance and testing of Colour Light Signalling, Cabling, Telephone Train Control, Telegraph Circuits, Pole Lines, Mechanical Signalling and Single Line Block apparatus. A knowledge of V.H.F. radio would be an advantage.

Post (b): Candidates must have had a working experience of laying in mechanical signal apparatus, particularly the "Westinghouse" double wire type, be capable of repairing same and must be capable of taking charge of and instructing local Signal Staff on such works. A practical knowledge of interlocking, hand bench fitting and repairing is essential.

Salary: Post (a): In scale £1,100 x £50 per annum to £1,900 per annum. Appointments may be on pensionable terms or on contract with a gratuity payable on completion of contract at the rate of £18.6.8 to £31.13.4. for each completed month of service.

Post (b): In scale £1,000 x £50 per annum to £1,500 per annum. Appointments are on contract with a gratuity payable on completion of contract at the rate of £16.13.4. to £25.0.0. for each completed month of service.

The above salary scales are inclusive of Overseas Pay and the starting salary will be according to qualifications and experience.

Tours: 15 months in Nigeria followed by 15 weeks' leave on full pay.

Quarters: Partly furnished quarters are provided at low rental.

Allowances: There are attractive family, travelling, transport and other allowances.

Send postcard before 7th January, 1960, mentioning the post and this paper for further particulars and application form to:—

The London Representative,
Nigerian Railway Corporation,
Nigeria House, 9 Northumberland Avenue,
London, W.C.2.

TECHNICAL RECORDS CLERK required for the collation and distribution of technical service information on diesel engines and associated equipment in main line diesel electric locomotives. Applicants should be familiar with diesel engines and if possible complete locomotives. Salary £700-£900 according to qualifications and experience. Please send, in confidence, brief details of experience, positions held and salaries to Manager, Traction Dept., Sulzer Bros. (London) Ltd., 31, Bedford Square, London W.C.1.

THE DIRECTOR GENERAL, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tenders for the supply of:

	Quantity Nos.
Double Acting, Telescopic Hydraulic Shock Absorbers	790

Forms of tender may be obtained from the above address on or after December 11, 1959, upon payment of a fee of 10s. which is not returnable. If payment is made by cheque, it should please be made payable to "High Commissioner for India." Tenderers must send their tenders so as to reach this Office by 2 p.m. on Monday, January 18, 1960.

Please quote Reference No. 38/59.DB/RLY.2.

Railway Stock Market

Bank rate uncertainties have affected sentiment in stock markets, where talk of a possible increase in the rate appeared to come as a surprise, though there are widespread expectations that it may be averted. The decline in gold and convertible currency reserves last month, combined with the decline in sterling in relation to the dollar, have made the bank rate a talking point, but there is no doubt that there are many grounds for confidence. Production is still rising and exports are making a good showing. It is widely believed that an increase in the British bank rate will be unnecessary unless money rates in the U.S.A. and Western Germany increase further, because, if they did, that would accelerate the flow of foreign money from London.

The mere hint of the possibility of a higher bank rate put British Funds down sharply, and there were many declines among industrial shares. Later, the lower prices attracted buyers and firmer market conditions developed.

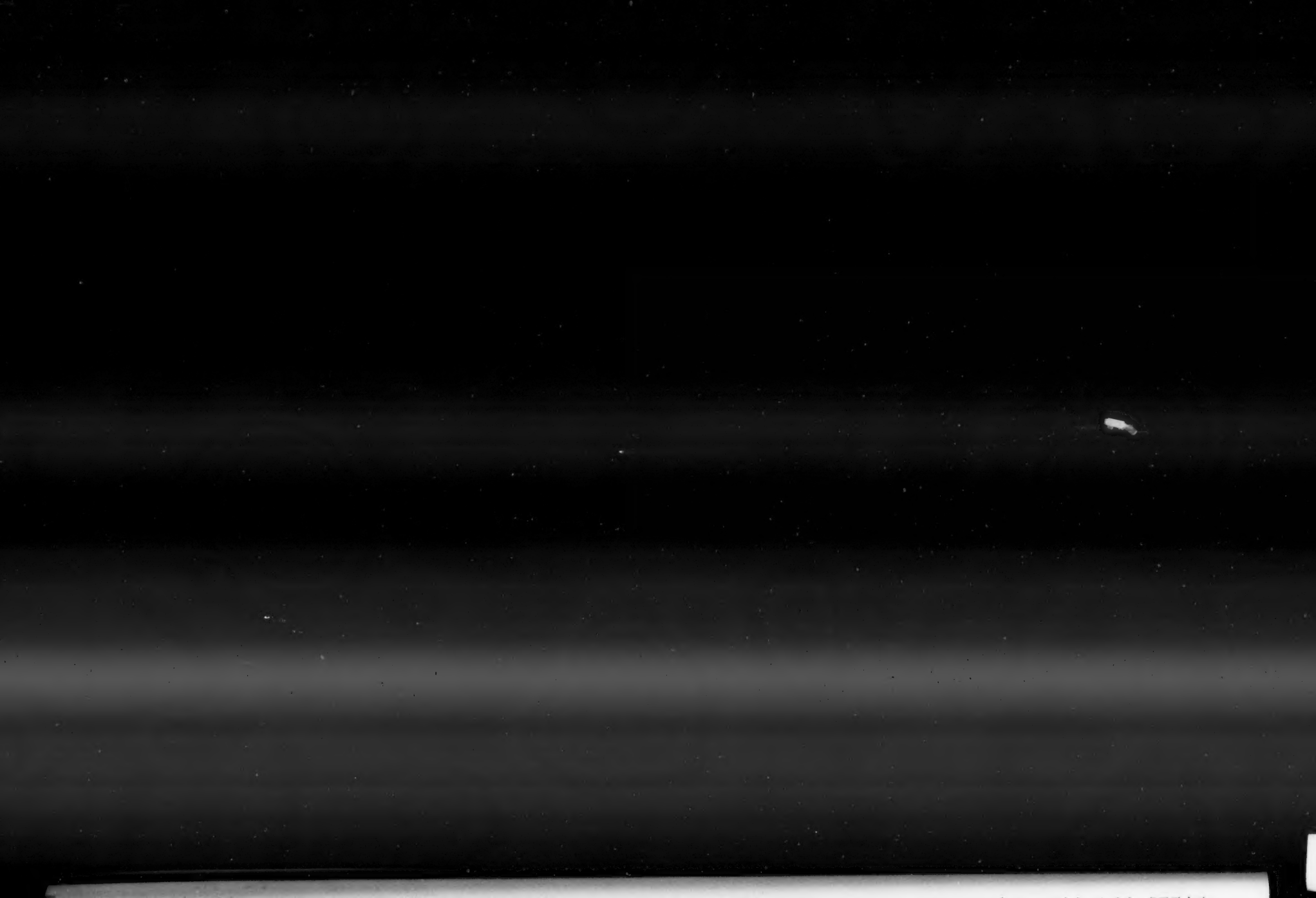
There were few changes among foreign rails, business in which was scarcely sufficient to test quotations. Antofagasta ordinary stock changed hands around 15¾ and the preference stock was firmer at 26¾, while the 5 per cent (Bolivia) debentures kept at 95½. Chilean Northern first debentures were 60, Guayaquil & Quito assented stock 80, and Paraguay Central prior debentures 18½.

International of Central America common stock was $22½ and the preferred stock $106. Mexican Central "A" bearer debentures eased fractionally to 56½. United of Havana second income stock remained at 6, and San Paulo Railway 3s. units have been dealt in around 1s. 6¾d.

West of India Portuguese capital stock was 108½ and the 5 per cent debentures 92½. Nyasaland Railways shares remained at 10s. 6d. and the 3½ per cent debentures were 55½.

Canadian Pacifics have been steadier around $46¾, but the preference stock and 4 per cent debentures, which are sterling securities, have been easier at 62½ and 66¾ respectively.

Despite the reaction in stock markets, engineering and kindred shares have been in somewhat better demand. Sentiment was helped by hopeful views about the outlook for 1960. It was also argued that recent declines in some shares, such as Babcock & Wilcox, had been unjustified. Babcock & Wilcox have rallied, and at 44s. 9d. were higher on balance, as were Clarke Chapman at 56s. Compared with a week ago, Vickers have moved up from 29s. 1½d. to 32s. 1½d. at the time of going to press.

Beyer Peacock 5s. shares have been steady at 8s. 6d., but Charles Roberts 5s. shares eased to 18s. Westinghouse Brake eased to 50s. Birmingham Carriage & Wagon have changed hands around 29s. 9d. and North British Locomotive were 8s. 10½d. Davy United were higher at 109s. 3d. Dowty Group 10s. shares touched a new peak of 48s. 9d. but later eased to 47s. 6d. Pressed Steel 5s. shares were 39s. 9d. Tube Investments were under the influence of Sir Ivan Stedeford's annual review, but at 120s. 9d. did not keep best prices. Metal Industries after rising on the half-yearly statement and higher dividend forecast, came back to 70s. 3d. Ruston & Hornsby at 28s. lost part of their recent rise, Ransomes & Marles 5s. shares were 25s. 6d. and Pollard Bearing 4s. shares 35s. 3d.

Elsewhere, B.I. Cables at 54s. 3d.xd were better on balance. Associated Electrical were 59s. 6d., English Electric 46s. 3d., and General Electric 43s. 6d. Crompton Parkinson 5s. shares changed hands around 17s. 7½d.